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THE MICRO USER

Volume 2
Number 4
June 1984
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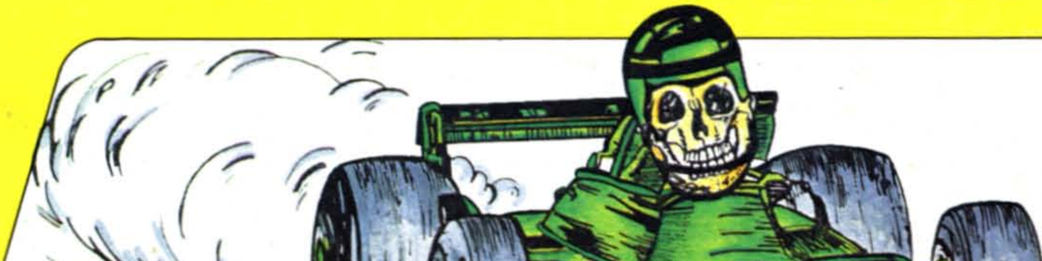
—See Page 105



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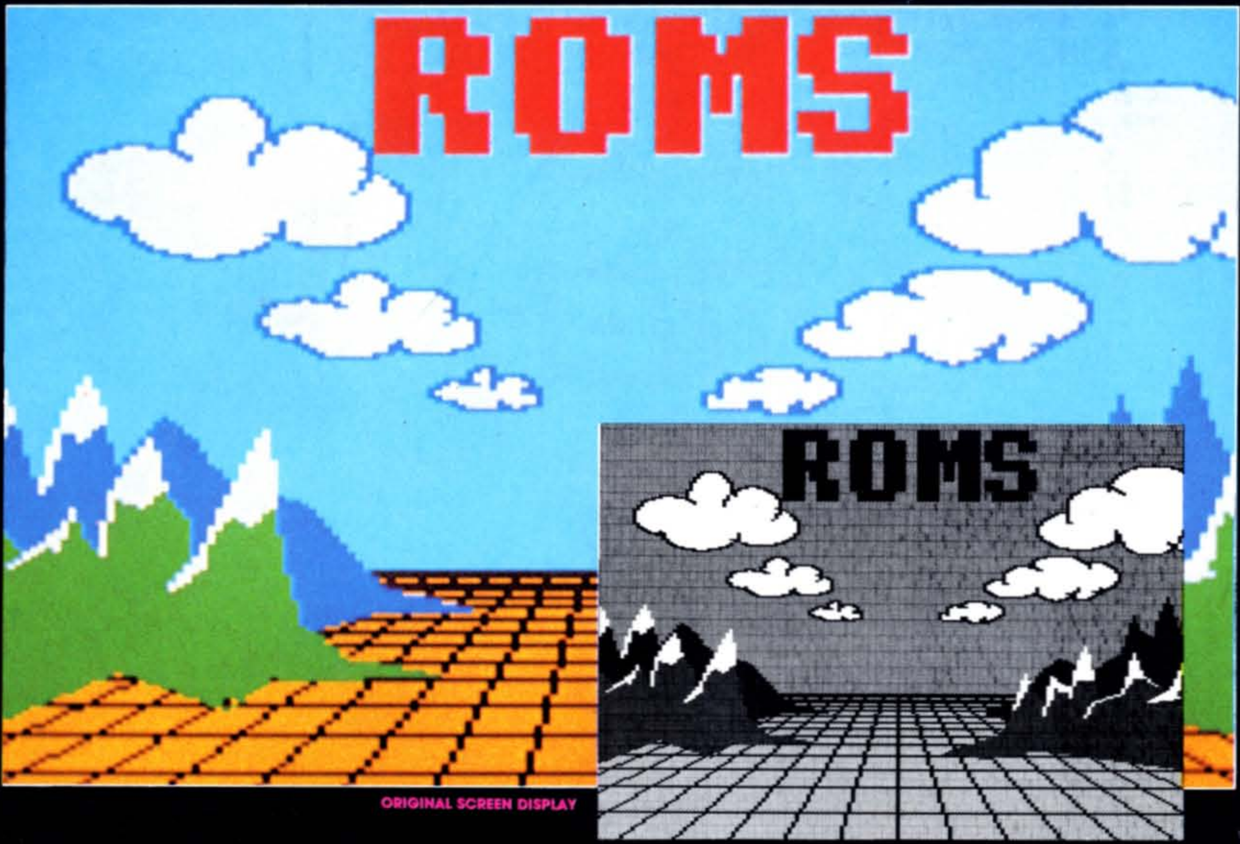

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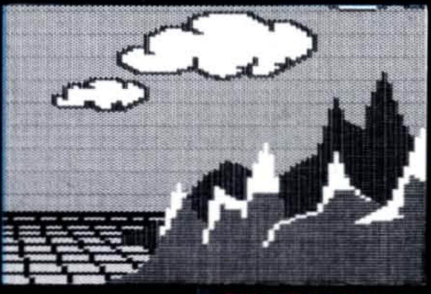

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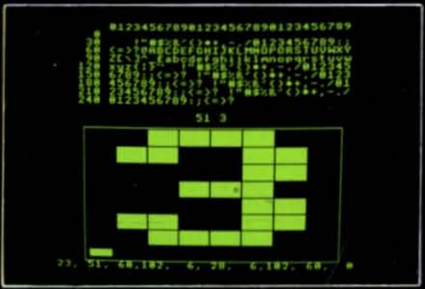

```
51 3
23, 51, 60,102, 6, 28, 6,102, 60, 0
```

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★DEFINE allows the redefinition of any user definable character in the simplest possible manner. See screen photo opposite. ★ USAVE and ★ULOAD can be used to save or load all user definable characters.

★WINDOW allows the user to interactively define a graphics window, this controls the part of the screen printed in ★GDUMP this is a very much easier method of defining graphics windows than the normal VDU statement.

The above list is only a fraction of the commands in the PRINTMASTER ROM. Others include ★CENTRE, ★UNDERLINE, ★ITALIC, ★MARGIN etc. etc. which provide total control over the printer. Order as PRINTMASTER (Epson).

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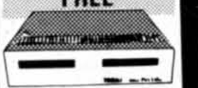

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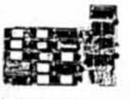

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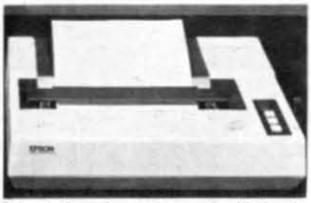

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Continued on page 57 ⟶

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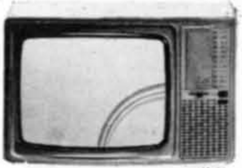

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TC68000	Torch Computer Twin 400K Floppy + 68000	3550.00	4082.50
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TC725U	Torch Computer 20Mb, 2x400K, 68000 + Unix	6050.00	6957.50
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TCF500	Torch Computer twin floppies (CF500)	2950.00	3392.50
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TCHDPZ80	Torch 20Mb Hard disc, 400K Floppy + Z80	2295.00	2639.25
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TCZ80SP	Torch Z80 Second Processor (ZEP100)	375.00	431.25
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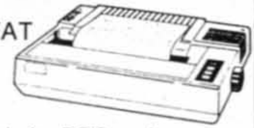

RX-80FT £245.52 + VAT

FX-80 £365.09 + VAT

Printer price includes cable for BBC and screen dump rom is available for £7.50

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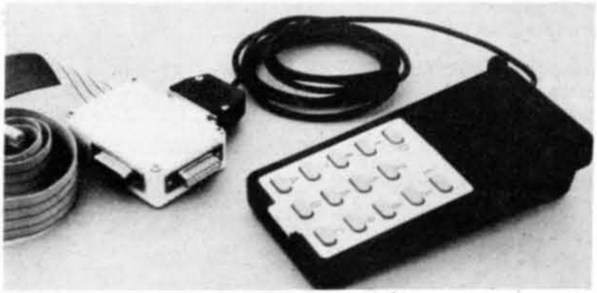
***10% off listed prices**



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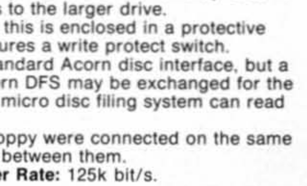
ANB01	BBC Model B Micro Computer	348.26	399.00
ANB02	BBC Model B with Econet Interface	389.14	446.00
ANB03	BBC Model B with Disc Interface	426.59	489.00
ANB04	BBC Model B with Disc & Econet Interface	467.45	536.00



3" Micro Disc £129.95 (inc. VAT)

Disc Interface & Drive £198.95 (inc. VAT)

Micro Disc Drive for the BBC Micro

The Micro disc drive offers a method of low cost quick access to programs. The drive is essentially a small version of a 5¼" disc drive and offers similar features to the larger drive.
The data is stored on a 3" disc, this is enclosed in a protective hard plastic cassette which features a write protect switch.
The micro drive requires the standard Acorn disc interface, but a new disc filing system rom. Acorn DFS may be exchanged for the micro DFS for £12.00. The new micro disc filing system can read and write to Acorn DFS discs.
Thus if a 5¼ inch and a micro floppy were connected on the same cable files could be transferred between them.
Capacity: 80.64 K bytes **Transfer Rate:** 125k bit/s.

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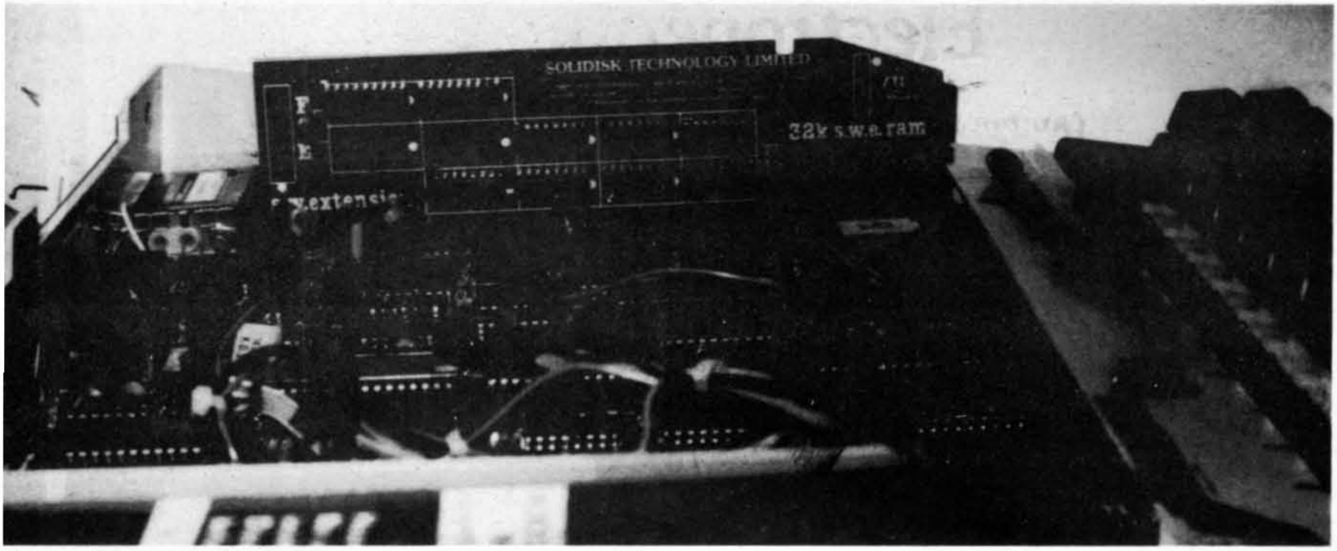


SOLIDISK SIDEWAYS RAM

Solidisk Sideways RAM is the most exciting add-on that many have been waiting for Acorn to produce! Sideways RAM systems have been described in detail in ECM, Acorn User, BBC Micro User etc., and become de facto the way to upgrade the BBC computer. Solidisk Sideways RAM is the first, most popular and most powerful implementation on the BBC computer.

Don't be deceived by salesman's gimmicky talk such as 'the Model C', the '52 k BBC computer' or 'the more you pay, the more you get'. Ask questions and find out the facts and figures.

Compare products — and then decide.

HOW EASY TO INSTALL?

Installing the Sideways RAM on your BBC micro is quite straightforward: push the base unit into the rightmost sideways socket, plug in the control wire terminals and the sideways RAM board into the base unit (see pictures). Insert the utility disc and press the SHIFT-BREAK keys . . .

HOW ABOUT COMPATIBILITY?

The Sideways RAM is completely compatible with all issues of BBC computers, disks, all sideways ROMs, the tube and second processors. Torch disk pack, Teletext, Econet etc. but NOT with ROM extension boards, since it can replace them.

Its power consumption is so low that you can use it in conjunction with twin disks.

HOW DOES IT WORK?

Occupying the same place as sideways ROMs (such as BASIC, WORDWISE, DISC DOCTOR), it is treated like other Sideways ROMs and therefore can replace them. It is ideal for developing ROM-able application programs and eventually it enables ROM based software to be sold unchanged on tape, disk or by electronic mail.

Unlike the Aries B20 board, the Machine Operating System communicates with Sideways RAMs as naturally as with Basic, without complicated procedures such as unknown *FX calls or the need adhere to new programming rules. With Sideways RAM, you can SAVE, LOAD and RUN. You can also write programs in ANY language, using any filing system.

HOW ABOUT SOFTWARE?

Solidisk Sideways RAMs have a much larger range of uses than any other system and the software support is free. Take a look on some of the programs supplied:

MULTITASKING DISK FILING SYSTEM.

By adding extra facilities to the present Acorn's DFS, it is now possible to run more than one program at a time. Furthermore, we are aiming at beating Sinclair's QDOS in the near future.

RAM FILING SYSTEM:

Strikingly similar to disk filing systems but can be used with tape, programs and data can be directly put in ROM form thus enabling stand alone applications to be implemented economically. The ROMs made with STL-RFS is also Electron compatible. (See EPROM products for more details)

PRINTER SPOOLER:

Printer output can also be directed to Sideways RAM and printing will carry on in the background while your computer is busy processing.

RAM-DISC:

The Solidisk is a RAM disc in your system. It works EXACTLY like an extra disc drive but a lot faster as it has no inertia. Capable of loading or saving at 40,000 bytes a second, it is responsible for the outstanding performance of SILEXICON and WORD64 (see opposite page).

The Solidisk resides entirely in Sideways RAM and does not use any bytes of the normal RAM.

The Solidisk is a marvellous productivity tool in every application field: compilers, data base, 3D graphic, Wordprocessing, Engineering, CAD, Music and speech synthesis etc.

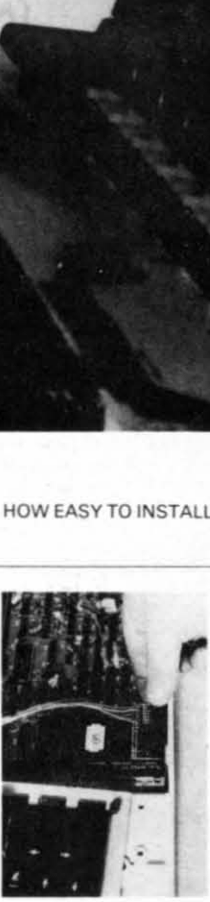
HOW ABOUT THE FUTURE?

Also unlike other makes (SIR, APTL, WE Sideways ROM/RAM extension boards and the Aries B20), Solidisk Sideways RAM is expandable from 16k right to 128 k and to 256k in July. It is a fraction of their cost thanks to Texas Instruments and INMOS advanced VLSI technologies.

That awesome power is the reason why you should handle it with care.

Solidisk sideways RAM has created a rapidly growing user group and we are working flat out to step up production for the dealers.

HOW EASY TO INSTALL:



Push in the base unit

Connect the control wires

WHICH SIDEWAYS RAM DO YOU NEED?

Solidisk Sideways RAM is available in 16k (SWR16), equivalent to 1 sideways ROM, 32k (SWR32), equivalent to 2 sideways ROMs or 128k (Solidisk), equivalent to 8 sideways ROMs. You can buy a small Sideways RAM now and upgrade it later. From the SWR16 to the SWR32 is by straight exchange, from the SWR32 to the Solidisk is by adding the Solidisk Extension which holds 96K of memory on just 3 square inches!

FREE SOLIDISK SOFTWARE SOFTWARE SUPPORT SERVICE:
IN WORDPROCESSING:
WORD 64:
Using the Solidisk as working space for WORDWISE, WORD64 offers up to 64K free characters for any text.
Using WORD64, you can write much larger programs than BASIC normally handles!

IN SPELLING CHECKER:
SILEXICON:
SILEXICON scans texts at more than a 1,000 words a minute and comparing each word against the dictionary, Silexicon marks the mis-spelt words for either addition to the dictionary or eventual correction.
A disk based program would make a lot of noise accessing the dictionary, SILEXICON takes advantage of the non inertia of Sideways RAM and runs quietly at more than 20 times the speed. Silexicon works with the Solidisk or a second disk drive.

IN DISK FILING SYSTEM:
STL150: this utility program enhances Acorn DFS.90 by moving disk working space into sideways RAM leaving PAGE at &EOO and adding extra disk commands. With STL150, you can format 40/80 track dikettes, verify and have up to 150 directory entries per side. Many DFSs have similar features (such as WATFORD DFS) but none has as much as STL150.

IN PORTABLE APPLICATIONS:
SOLIDISK RFS
Solidisk RFS (RAM/ROM filing system) is an innovation. Save and load your program, open a file for BPUT, BGET directly in Sideways RAM at 60,000 bytes a second. More: the STL RFS has a Sideways ROM format, it can be copied onto EPROM to give instant recall of your programs. Plug this EPROM into any sideways socket, type * RFS and it runs itself. Imagine the profit in selling your program in EPROM!. Compatible with the ELECTRON and BBC, tape and disks, SWR16, SWR32 and Solidisk.

IN SYSTEM MANAGEMENT:
THE MENU PROGRAM
This program puts all computer's resources at your fingertips helps to set up your firmware, disks etc by simple menu options.

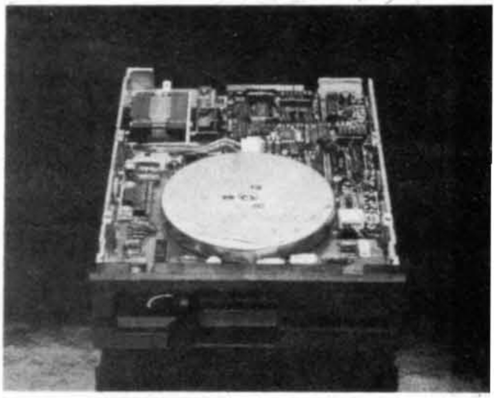
MORE FREE SIDEWAYS RAM SOFTWARE TO COME:
While others are making promises for software to be written, Solidisk Sideways RAM comes with a complete, novel and powerful software package including compatibility with existing sideways software. Right now, the STL RFS has the same effect on the BBC computer that the DFS had 2 years ago — that means masses of low cost software on the line!
Each Sideways RAM is accompanied by the Sideways RAM User Manual, full 1 year warranty, a utility disc containing 100k of programs and free mailing on all new publications from the Software Support Service.
Available soon: the Source Code and Technical Manual (3 floppies and a 300+ page book) price = £10, the SILEXICON EXTENSION PACKAGE (3 floppies and a 40 page manual, 30,000 word dictionary: English and French now, German and Spanish planned) price = £9.00. '4S' also publishes regular updated SWR utility discs at £3.00. Every user can do contract work for the SUPPORT SERVICE and make a lot of money for him/herself!
In other words, the Solidisk Sideways RAM is not only a wide choise now by saving you money but also a long term INVESTMENT.

EPROM AND OTHER PRODUCTS FROM SOLIDISK:
You can also purchase a growing range of add-ons designed to be used in the same base unit such as EPROM programmer now, Teletext receiver and 8088 second processor later. We also product disk systems based on the TEAC FD55 series. A detachable keyboard case and portable CPU case for the BBC computer is well under way for delivery in JUNE.
We also have the whole range of SANYO colour monitors, EPSON printers and VERBATIM dikettes at very competitive prices. Please ring us for a quotation.

HOW TO ORDER?

To order the Sideways RAM is simple: complete the coupon below. Access and Barclay card holders can place their order by phone on Southend (0702) 334766/334777.
Large organisations, dealers and OEMs can obtain quantity discounts. Please ring for quotations (0702) 354675.
Administrative and brief technical enquiries: (0702) 354674.

TEAC DISC DRIVES FD55 Series



Prices include:
- ● case
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- ● manual
- ● 2 year warranty

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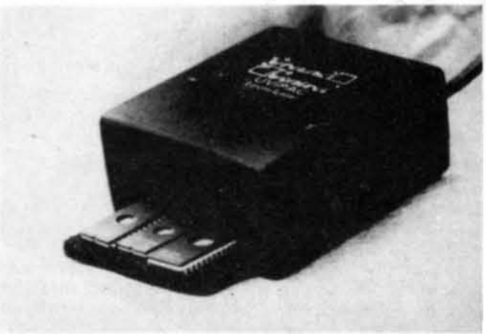

ORDER FORM:

Item:

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SWR16	£41.65
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DISC DRIVES FOR THE BBC MICRO

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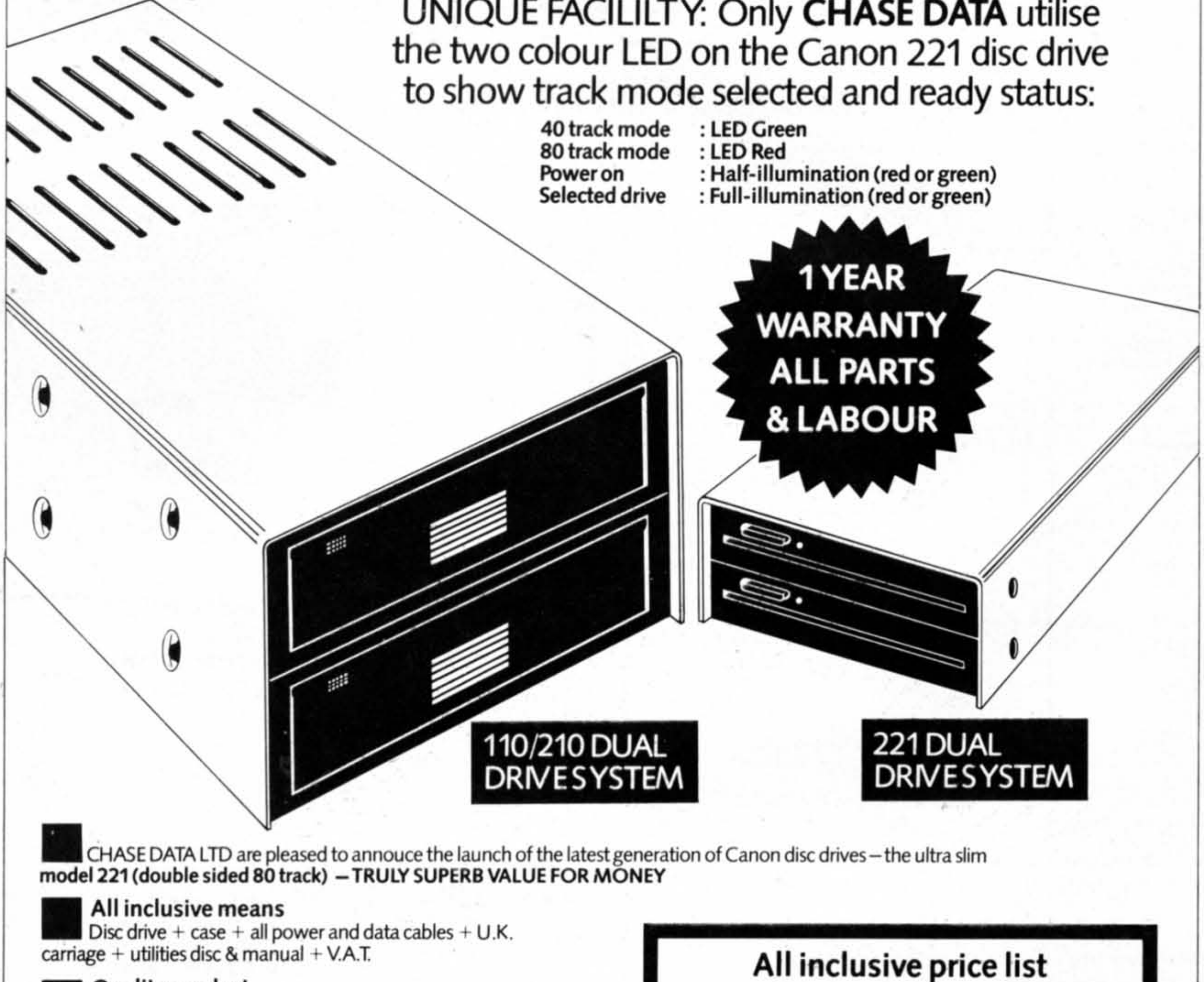

CHASE DATA LTD are pleased to annouce the launch of the latest generation of Canon disc drives – the ultra slim **model 221 (double sided 80 track) – TRULY SUPERB VALUE FOR MONEY**

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Disc drive + case + all power and data cables + U.K. carriage + utilities disc & manual + V.A.T.

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EPROMS 2764-250 nS £5.75p each.

All inclusive price list

MODEL	110	210	221
FORMATTED CAPACITY OF SINGLE DRIVE ON BBC MICRO	**100K**	**200K**	**400K**
SINGLE DRIVE IN CABINET	**£170**	**£198**	**£236**
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All units available with on-board power supply. Additional cost: **£25**.

Send remittance (Cheque only please) with your order to:

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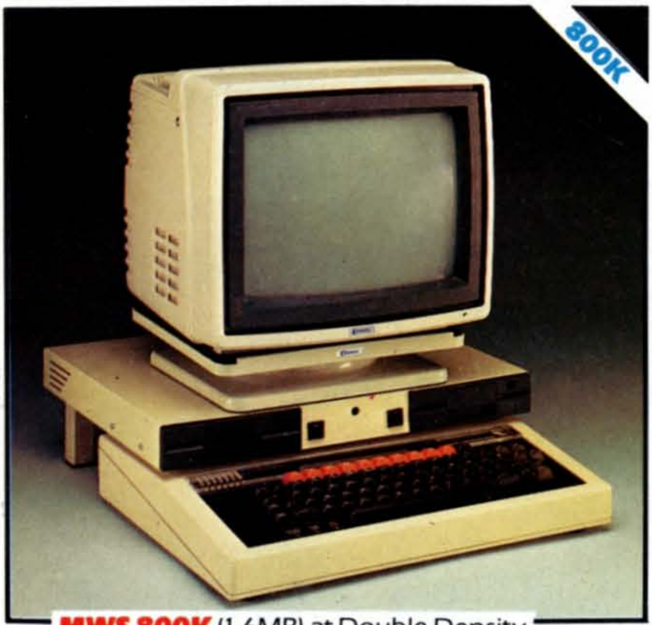

MWS 800K (1.6MB) at Double Density.
DUAL DRIVES from Toshiba.
These drives are double sided/double density and are 40/80 Track Switchable.

MWS 400K (800K at Double Density).
SINGLE DRIVE from TOSHIBA.
This drive is also double sided/double density and is 40/80 Track Switchable.

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200K

MWS 200K.
A SINGLE DRIVE from SEIKO.
This drive is double sided/single density.

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Scotland: Branches in Edinburgh and Glasgow. Aberdeen opening soon.	MICROWORLD **(Andrew Whyte & Son Ltd)** **12 Leven Street, Edinburgh** **EH3 9LG. Tel: 031-228 1111**
Channel Islands:	Berry's Office & Computer Supplies Ltd. **Charroterie Mills,** **St. Peter Port, Guernsey, C.I.** **Tel: 0481-28797**

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All Government and Educational enquiries in England & Wales:

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Level:4
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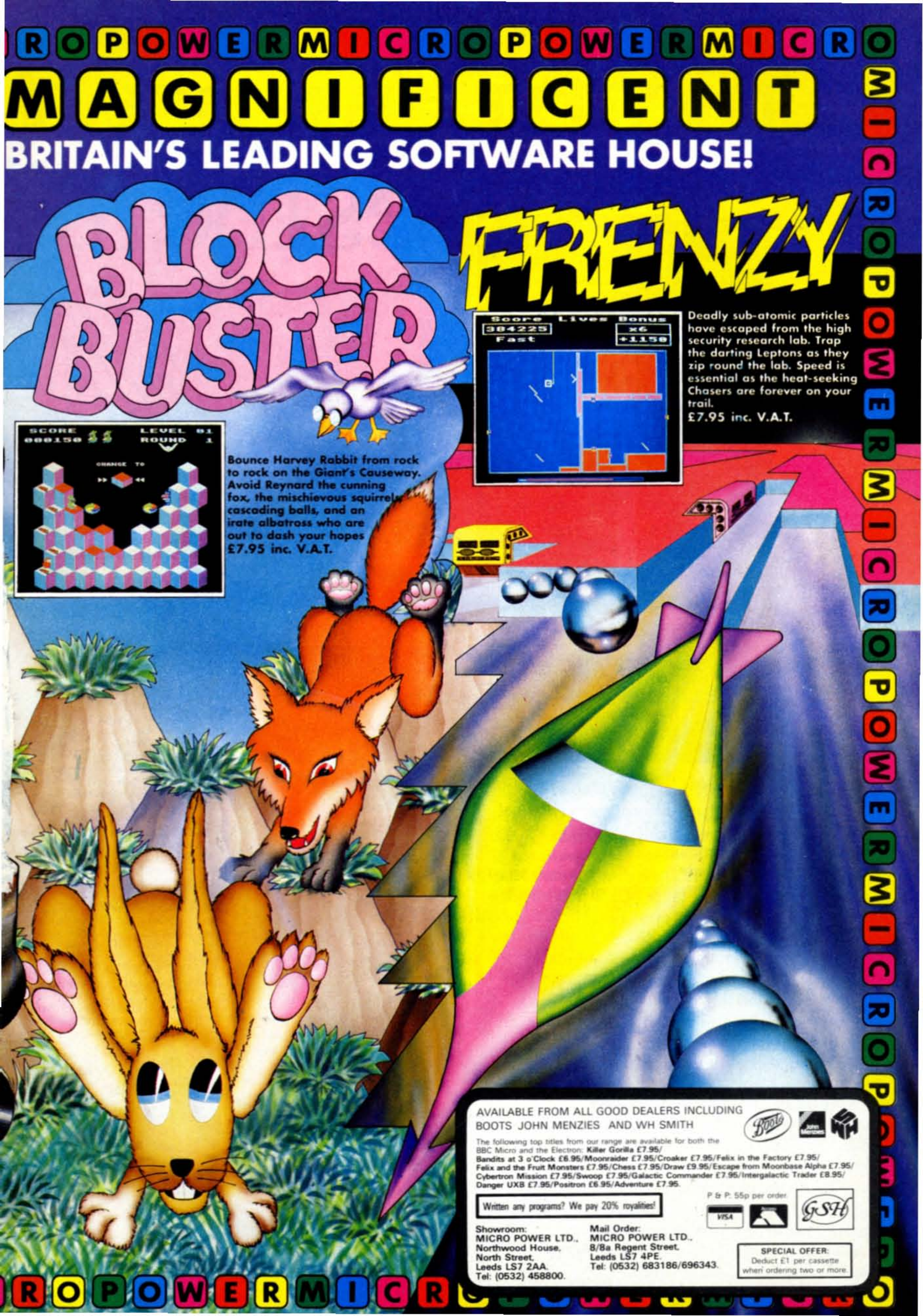

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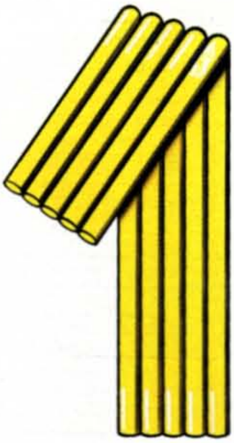


The new UNICORN range from TORCH Computers gives the enthusiast and professional user a choice of upgrades which takes the BBC Model B Micro to the ultimate height of performance.

The result of TORCH'S total commitment to the BBC Micro is the only complete range of high performance hardware available. Offering every BBC Micro owner five new upgrade channels, UNICORN will transform your BBC into a fully communicating workstation, a CP/M® compatible business machine or the ultimate in high powered 32-bit data processing.

At the top of the range, THE UNICORN, offers the power and sophistication of System III UNIX® whilst other channels make available the flexibility of languages such as FORTRAN, PASCAL, BCPL and COBOL. All models, with the exception of the HDP240, provide BBCBASIC(Z80) on the Z80 rather than the Model B's 6502.

Tune in to the Channel that most suits your requirements. Whichever level you choose you can be sure of a system with infinitely expandable potential for a confident future in the world of computing.

TORCH CELL
TORCH
TORCH
Writer
Speller
TORCH
Calc
Perfect Filer
Filer
Calc
Scotch
diskettes

The ZEP 100

- ● **Z80 Extension Processor**
- ● **4MHz Z80A**
- ● **64K RAM**
- ● **24K ROM**

The object of any upgrade kit is to improve processing ability and to increase data storage capacity. The UNICORN ZEP100 is the first stage upgrade which opens channels into the world of serious computing.

The ZEP100 is the proven 8 bit second processor for the BBC Model B micro. A Z80 extension processor which enables the use of the well established CPN operating system, giving access to the vast range of applications programs and languages available for all CP/M® micros. When fitted to a BBC model B microcomputer with compatible high quality disc drives it provides a complete business or scientific computer which can run large applications programs or use advanced languages, with the ability to switch back to standard BBC programs at any time.

Any ZEP100 can be linked, via the Econet® option on the BBC, to a network of other TORCH computers to provide a workstation running on TORCHNET. Full TORCHNET operating systems software is provided to allow access to information anywhere on the network, or to communicate with other computers.

The 64K ZEP100 is supplied with full software support including word processing, spreadsheet, database and utilities. **The ZEP100 – around £299 (ex. VAT).**

hannels for the BBC. programme.

The ZDP 240

- 4MHz Z80A ● 64K RAM
- 24K ROM
- Twin, double sided 400K floppy discs
- Independent integral power supply

CH Z80 DISC PACK

The UNICORN ZDP240 (Torch Z80 Disc Pack) is the proven upgrade for the BBC Model B microcomputer. Offering the use of more powerful and flexible languages such as Fortran, Pascal, BCPL and Cobol, it provides 800K of disc storage plus a Z80 second processor with 64K RAM running TORCH's own CP/M® compatible operating system based in ROM.

This advanced design means that almost all of the 64K RAM provided by the Z80 board is available for CP/M® programming use – an advantage no other BBC micro upgrade can offer.

If your BBC micro has the Econet® option, there is a further benefit the ZDP240 can offer. TORCHNET can link together up to 254 upgraded Model B's on a local area network, so for enthusiasts, Clubs and Schools it is a simple and low-cost way to achieve networking facilities.

The discs can be used for storage under the Acorn DFS system or for CP/M® programs and data.

A comprehensive software package is provided with the disc pack. It includes word and data processing and a spreadsheet program, along with utility programs and manuals.

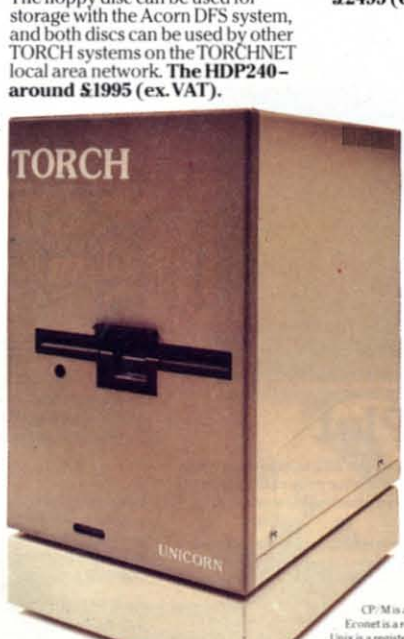
The TORCH Z80 Disc pack is recommended by the CCTA for government use. **The ZDP 240 – around £699 (ex. VAT).**

The HDP 240

- 20Mbyte hard disc Winchester
- Double sided 400K floppy disc
- Integral power supply

For users who need much more storage capacity than is available on floppy discs and who require the large speed gains that a Winchester hard disc provides, the third new channel is now available.
The UNICORN HDP240 combines a 400K floppy disc drive with a 20Mb hard disc and its associated controller. The pack connects directly to the disc and IMHz bus sockets on the BBC Model B.

In conjunction with a ZEP100, it provides a powerful business computer for running CP/M® programs with large amounts of data. The floppy disc can be used for storage with the Acorn DFS system, and both discs can be used by other TORCH systems on the TORCHNET local area network. **The HDP240 – around £1995 (ex. VAT).**



The HDP68K

- 8MHz MC68000 ● 6MHz Z80B
- 256K RAM (68000)
- 64K RAM (Z80)
- 20 Mbyte hard disc Winchester
- Double sided 400K floppy disc
- Integral power supply

The fourth channel in the UNICORN range is for users who need the extra processing power of a 68000 32 bit processor, as well as the Z80 running standard software. The UNICORN HDP68K provides the ultimate in performance, offering an extra 256K RAM and a 68000 processor running at 8 million cycles per second. It also contains a Z80 processor to allow the running of existing TORCH software.
The HDP68K – around £2495 (ex. VAT).

The Unicorn

Spec. as HDP68K PLUS UNIX® operating system.

UNIX® System III is the recognised operating system of the '80's. A very powerful and sophisticated multi-tasking system, it includes a vast library of utility programmes.

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UK version Model B necessary.
Disc interfaces are necessary for use with the Unicorn range.

Text and Graphics provided by BBC Model B.
Keyboard provided by BBC Model B.

More Programs.. m

Gemini

Serious Software

New – Improved **Database**

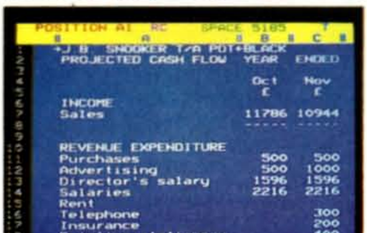
This new memory based database from Gemini, which uses machine code to optimise the memory available and improve processing speed, includes the following features:

Records are presented as a completely user-definable card on the screen, with up to 15 fields of data. Main routines provide the facility to add, modify or delete records, to sort the entire file by any record, and comprehensive searches may be peformed using combinations of any fields. Results of searches may be screened or printed as a summary of up to six fields, or as complete records. Calculations allow field contents to be derived from a number of other fields, which may be used for example, to give total, average etc.

Strongly recommended as an invaluable program for home, business, or educational requirements.

Users who have purchased earlier Gemini Database programs may exchange them for the new improved version by sending their disk or cassette, manual and £9.95 direct to Gemini

SPREAD SHEET ANALYSIS - *"... Well documented, easy to load, excellent screen display."* — Home Computing Weekly.



```
POSITION A1  RC    SPACE 5185     T
    A             B       C
 +J B  SNOOKER T/A POT+BLACK
 PROJECTED CASH FLOW  YEAR   ENDED

                      Oct     Nov
                       £       £
 INCOME
 Sales               11786   10944
                     -----   -----

 REVENUE EXPENDITURE
 Purchases             500     500
 Advertising           500    1000
 Director's salary    1596    1596
 Salaries             2216    2216
 Rent
 Telephone                     300
 Insurance                     200
 Printing,stationery           400
 Repairs & renewals
 Hire of equipment      60      60
COMMAND BCDEFGPRSTW#?
```

Spread Sheet Analysis

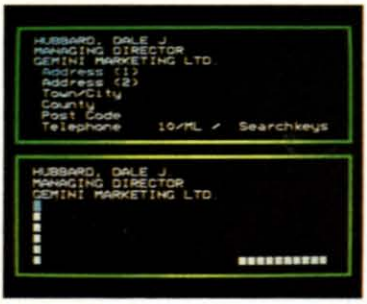
Perhaps the most commercially successful item of business software yet written, the Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If, say, the cash receipts for January need to be changed, it would normally be necessary to delete and re-calculate several figures for each successive month.

With SPREAD SHEET, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulæ cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs.

SPREAD SHEET has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Full printer facilities are included which allow for either the table to be printed or just the data and formulæ relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. The sister program GRAPHPLOT will take data from disk or tape files created by this program to provide data portrayal in graph, histogram or pie chart format.



```
HUBBARD, DALE J
MANAGING DIRECTOR
GEMINI MARKETING LTD
 Address (1)
 Address (2)
 Town/City
 County
 Post Code
 Telephone      10/ML /  Searchkeys
```

```
HUBBARD, DALE J
MANAGING DIRECTOR
GEMINI MARKETING LTD
```

MAILIST - *"A very professional piece of software"* —Which Micro.

Mailist

A superb dedicated database to allow for manipulations of names and addresses and other data. Gemini's unique 'searchkey' system gives you a further ten 'user-defined parameters' to make your own selections. Features include the facility to find a name or detail when only part of the detail is known, it will print labels in a variety of user specified formats.

New – *£39.95*

Random Access Mailist

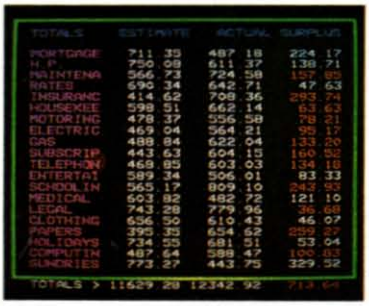
This program is an extended version of the standard Gemini memory based mailing list, providing random access files on disk, and improved printing facilities. The features of the program include:

Up to 2000 names and addresses can be stored and accessed as one data file — approximately 500 records for each 100 Kbytes of disk capacity, and up to four drives of 40 or 80 track format are catered for. Routines are provided for sorting the file alphabetically by name, searchkey, or other field heading, and for comprehensive search features, using ten user-defined searchkeys. Printouts that may be obtained include a field summary in column format, and up to 3 labels may be printed horizontally, with user specified tabulation. Suitable for most makes of printer with little or no modification.

Home Accounts

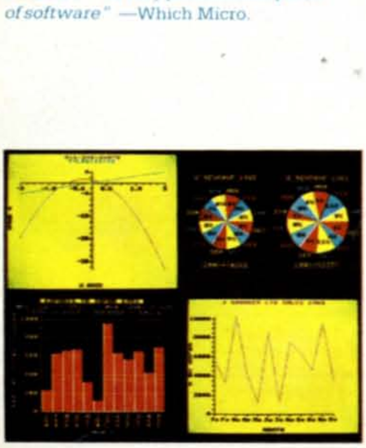
Designed as a complete Home Accounting package this program allows the user to set up a budget for items of household expenditure and compare actual expenditure with budget. A running total of all surpluses and deficits is available both as digits, and in the form of a bar chart.

A complete Bank account routine is included together with suggested expenditure categories such as mortgage, rent, rates, telephone, gas, electricity, etc, however, these may be deleted or augmented without difficulty.



```
TOTALS       ESTIMATE    ACTUAL   SURPLUS

MORTGAGE     711.35     487.18    224.17
H.P.         750.08     611.37    138.71
MAINTENA     566.73     724.58    157.85
RATES        690.34     642.71     47.63
INSURANC     414.62     708.36    293.74
HOUSEKEE     598.51     662.14     63.63
MOTORING     478.37     556.58     78.21
ELECTRIC     469.04     564.21     95.17
GAS          488.84     622.04    133.20
SUBSCRIP     443.63     604.15    160.52
TELEPHON     468.85     603.03    134.18
ENTERTAI     589.34     506.01     83.33
SCHOOLIN     565.17     809.10    243.93
MEDICAL      603.82     482.72    121.10
LEGAL        743.28     779.96     36.68
CLOTHING     656.50     610.43     46.07
PAPERS       395.35     654.62    259.27
HOLIDAYS     734.55     681.51     53.04
COMPUTIN     487.64     588.47    100.83
SUNDRIES     773.27     443.75    329.52
TOTALS > 11629.28 12342.92       713.64
```



Graph Plot

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

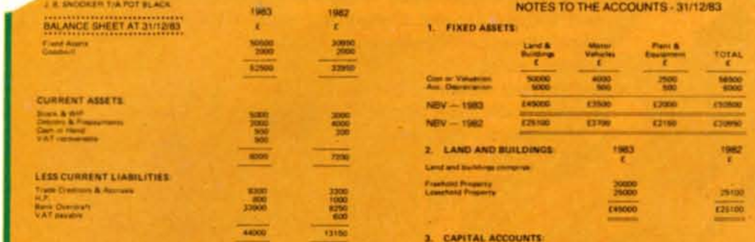
For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs... for easier visual comparison and assimilation.

GRAPH PLOT also incorporates a built in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Spread Sheet Analysis and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

GRAPH PLOT — *"Excellent displays with high resolution and good colour co-ordination"* — The Micro User.

ore Programs.. more

Business Software


J. S. SNOOKER T/A POT BLACK
BALANCE SHEET AT 31/12/83
CURRENT ASSETS
LESS CURRENT LIABILITIES
REPRESENTED BY:
NOTES TO THE ACCOUNTS - 31/12/83
1. FIXED ASSETS
2. LAND AND BUILDINGS
3. CAPITAL ACCOUNTS

Final Accounts

Requires Cash Book module. This program will take your cash book data to the logical conclusion of balance sheet, trading and profit/loss account and notes to the accounts i.e. fixed assets, land and buildings and capital accounts. Interfaces with Graph Plot for graphic data presentation.

Invoices & Statements

This program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the program produces professionally formated documents using your own printer.

Word Processor

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include, block delete, block insert, search and replace, edit text, display text, and many more.

Payroll

Managing the Payroll for up to 50 employees, this program is user friendly being menu driven, easy to use and supported by comprehensive documentation.

It shows gross pay, net pay and overtime for hourly, weekly or monthly paid employees, and holds most PAYE and NHI data together with essential SSP information.

Payrolls are automatically analysed under departmental heads and the most frequently used PAYE forms such as P14, P35 and P60 printed when required.

Stock Control

Dedicated software with all that's necessary to keep control of stock. This program will take the tedium out of stock control and save time and money. Routines include stock set up, user reference number, minimum stock level, financial summary, line print records, quick stock summary, add stock, delete/change record and more.

Easiledger

Contains routines to enable the small businessman to keep a record of one of the most important aspects of his business—cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both the Easiledger and Cashbook programs together.

Cashbook

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and provides a computerised system complete to trial balance.

Written by practising Chartered Accountants and coded by professional programmers, the system is practical, user friendly, and replaces manual cash and bank records. From sheaves of invoices and cheque book stubs, it will take you to trial balance and produce VAT summaries, Receipts and Payments analyses, departmental sales and purchases analyses, and a full audit trail.

Combination Packs

Designed to offer maximum value and convenience to the serious business or home user by combining several programs in one pack.

	Normal list Price of programs in pack:	Combination Pack Price	SAVING... £
Combination Business Pack No. 1			
Contains: Graphplot, Spreadsheet Analysis, Payroll, Cash Book, Final Accounts			
C.0113 BBC 32K Cassette	199.95	**159.95**	40.00
D.0113 BBC 32K 40 Track Disk	207.75	**159.95**	47.80
E.0113 BBC 32K 80 Track Disk	212.75	**159.95**	52.80
Combination Business Pack No. 2			
Contains: Database, Stock Control, Word Processor, Mailist, Invoices & Statements.			
C.0114 BBC 32K Cassette	99.75	**79.95**	19.80
D.0114 BBC 32K 40 Track Disk	119.75	**79.95**	39.80
E.0114 BBC 32K 80 Track Disk	124.75	**79.95**	44.80
Combination Business Pack No. 3			
Contains: Database, Stock Control, Spreadsheet Analysis, Invoices & Statements, Mailist.			
C.1615 ELECTRON	99.75	**79.95**	19.80
Combination Home Pack No. 1			
Contains: Database, Home Accounts, Mailist, Spreadsheet Analysis, Graph Plot.			
C.0116 BBC 32K Cassette	99.75	**79.95**	19.80
D.0116 BBC 32K 40 Track Disk	119.75	**79.95**	39.80
E.0116 BBC 32K 80 Track Disk	124.75	**79.95**	44.80
C.1616 ELECTRON	99.75	**79.95**	19.80
Combination Home Pack No. 2			
Contains: Database, Home Accounts, Graph Plot, Mailist.			
C.0417 SPECTRUM 48K	79.80	**59.95**	19.85

Available from most good software dealers and larger branches of WH Smith and Boots, or phone Gemini for immediate despatch quoting your Access, Visa or American Express card number. **Telephone (0395) 265165/265832** Alternatively send your cheque or Postal Order made payable to: **Gemini Marketing Ltd.**

Please send urgently: *BBC 32K/ELECTRON* (please delete)

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Please tick appropriate box. Prices include VAT and Post and Packing (UK only), for all programs on this double page, **except Cash Book, Final Accounts, Payroll, Random Access Mailist and Combination Packs.**

☐ Cassette *£19.95* ☐ 40 Tr disk *£23.95* ☐ 80 Tr disk *£24.95* ☐ 3" disk *£25.95*

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PAYROLL *£39.95*
RANDOM ACCESS MAILIST *£39.95*
} Same price for Cassette, 40 or 80 track disk or 3" disk—Please specify

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Address ....

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GEMINI LEISURE SOFTWARE GEMINI LEISURE SOFTWARE GEMINI LEISURE SOFTWARE GEMINI LEISURE SOFT
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The Sting

BBC 32K - C.0157

Desperate to gather fruit for his starving cub, Bruno the Bear braves the the deadly wasp's attacks, defending himself with an aerosol of stunning spray. Attacked from all directions, can he avoid the wasp's deadly sting?

A fast moving addictive game, demanding the ultimate dexterity in controlling Bruno and avoiding the lethal STING!

MISSILE CONTROL

BBC 32K - C.0150
Electron - C.1650

You are in charge of three laser bases whose high powered destruct beams are the only defence against descending missiles and homing bombs. Only your skill and judgement stand between your cities and mass destruction... A brilliant game with superb graphics for one to four players using keyboard or joystick.

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THE MICRO USER
JUNE 1984

NEWS

QUEEN'S AWARD FOR ACORN, MICROVITEC

ACORN Computers has won the Queen's Award for Technological Achievement for the BBC Micro. The award pays special tribute to the BBC Micro's advanced design and it commends Acorn "for the development of a microcomputer system with many innovative features".

Chris Curry, Acorn's managing director, said: "This is a special honour for Acorn because it highlights the technical achievements of the BBC Micro system.

"We have consistently aimed to design computers that have set technological standards instead of merely meeting a price.

"Our approach is vindicated, both by the award and by the fact that two years since it was launched the BBC Micro is still the most advanced computer of its kind".

Chris Curry: "Setting technological standards"

The award also goes to Microvitec for the innovative technology of their Cub colour monitors.

The news came as Microvitec celebrated a record £9 million turnover in what is still only their fourth full year of operation.

Since the Cub monitors were introduced they have won approval from the BBC, the Department of Industry, the Department of the Environment and are said to be currently used in 95 per cent of Britain's schools.

Microvitec head Tony Martinez said: "I understand we are one of the youngest companies to receive the honour.

"Our market success during the four years of our operation has been entirely due to an all round team effort and the Queen's Award comes as a marvellous tribute to the work of all concerned".

IBM compatible upgrade for BBC Model B

IN a sideways move that looks as if it's going to leave rivals far behind, Data Technology has announced an IBM compatible upgrade for the BBC Model B.

Produced by a team whose members originally worked on the BBC Micro and Torch computers, the Graduate will upgrade the BBC Micro to a 16 bit business computer.

The development means that the Graduate plus the BBC Micro will give buyers IBM capability more cheaply than buying the IBM PC itself – with the possibility of full colour as well.

So far BBC upgrades, including Acorn's own Z80 second processor, have tended to base their products around CP/M compatible machines.

The strategy has been to open the wide range of CP/M software to the BBC Micro owner.

But this ignores the fact that the major thrust of software development is increasingly towards the IBM Personal Computer, which uses PC DOS, not CP/M.

Martin Vleiland-Boddy: "We've a winning team"

With the Graduate, it is claimed, BBC Micro owners will be able to take advantage of this ever-increasing and highly sophisticated IBM software.

The package looks extremely competitive. The minimum system – G400 – selling at £599, gives the BBC Micro not only 128k of RAM expandable up to 1.2 mbytes, but also a 400k BASF disc drive – independent of the BBC Micro's DFS.

The second system, G800, selling at £869, has twin disc drives plus full colour word processing, spreadsheet and database programs.

Both systems have expansion slots to take advantage of the wide range of IBM add-ons such as communication cards and hard discs.

Driving force behind Data Technology is Martin Vleiland-Boddy, the founder of Torch Computers.

Said Martin: "We've got a winning team together. On the hardware side there's Alan Wright, who worked on the BBC Micro and the Torch. For software we've got Paul Bond, who wrote the BBC Micro OS, to help us.

"And, of course, on the financial side there's my brother Clive, who's worked widely as a consultant for companies such as Acorn and Sinclair".

Pseudo user groups are expelled

COMPANIES with a commercial interest in the burgeoning BBC Micro market are trying to muscle in on the user group scene in the hope of making a financial gain, according to a spokesman for the Association of Computer Clubs.

The ACC is so concerned about the trend that it recently expelled Beebug and Laserbug from its membership.

"We were very unhappy about the fact that these organisations described themselves as user groups but in fact both clearly existed for commercial gain", said the spokesman.

Anti-pirate breakthrough

A LEADING software house has made a technological breakthrough which it believes will scupper most of the pirates currently pillaging the industry.

Rochdale-based A & F has developed the software at a cost of £20,000 to enable an anti-copying device to become 95 per cent effective.

"We now have a system that will make it virtually impossible for school children and computer clubs to make audio copies or computer dumped copies of our software", Mike Fitzgerald, the company's managing director, told *The Micro User*.

"Not only that, but it will have serious implications for the professional pirates".

The device has been patented by Jim Lamont of JLC Data, Barnsley, who hit the headlines recently when the Ministry of Defence snapped up a similar invention of his and placed an embargo on it.

"We had been talking to Jim Lamont about the one the MoD grabbed when the government stepped in and brought an end to that", says Mike Fitzgerald.

"It was at this point we decided to evaluate an earlier system of his. Now, three months later, we have the software to make it work".

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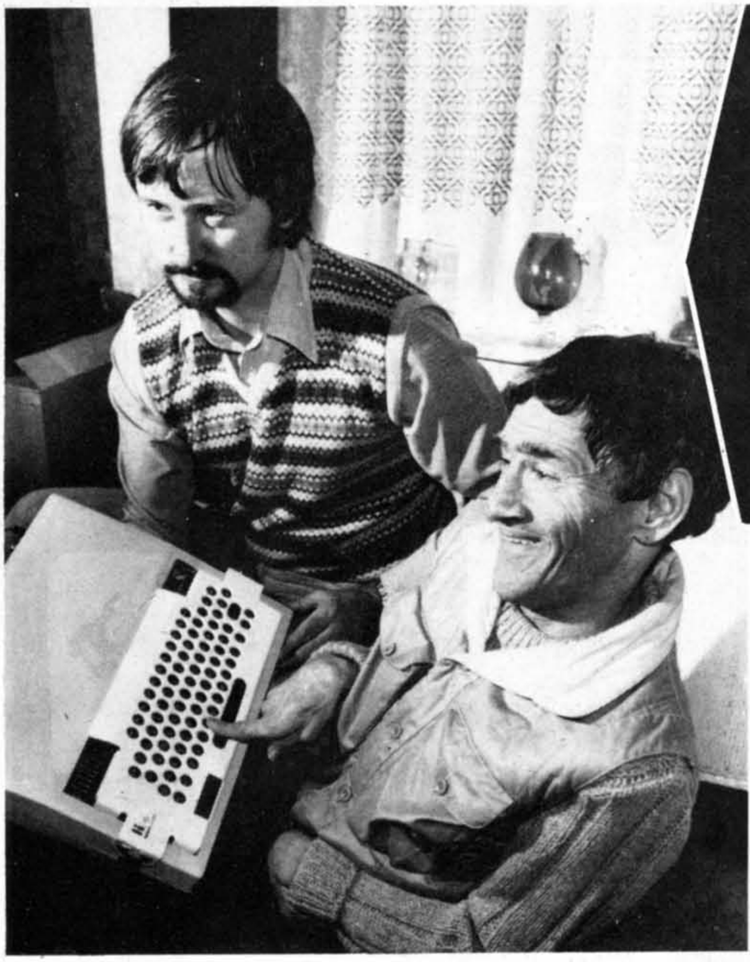
Please allow 21 days for delivery

Please note this is only suitable for existing DFS users

Tom's micro is the key to a bright new world



Social worker Frank Arbour looks on as Thomas Lindley tries out his specially-adapted BBC Micro

THOMAS Lindley has recently started his schooling. And so far he has delighted his widowed mother by being able to string a few words together – even though he is 46 years old.

For he was born a spastic and has remained almost completely crippled all his life.

In fact up until a few weeks ago, he was unable to master even a simple "yes" or "no".

It is little wonder then that most people dismissed him as having the IQ of a five year old.

Then along came social worker Frank Arbour, who introduced him to a BBC Micro – and the real Thomas Lindley is now about to stand up and be counted.

A few simple tests on the keyboard was enough to reveal that Thomas, far from being mentally retarded, may in fact be a man of considerable intelligence.

Frustrations

"We are already convinced that most of Thomas's learning problems stemmed from the frustrations imposed by his physical limitations", Frank Arbour told *The Micro User*.

"Naturally it has not been easy going. We have found considerable difficulties due to the fact that his disabilities prevent him from making the maximum use out of the conventional keyboard.

"However we expect that people already working in this field will be able to provide some of the answers in the not too distant future".

The Tameside social worker and his colleagues working on the case are hoping that not only will the BBC Micro open up educational horizons for Thomas but also eventually allow him some control of his environment.

What they would like to see is him using the micro to control electrical appliances around his home in Dukinfield where he lives with his 82-year-old mother.

Breakthrough

"If he could use it to switch on lights or boil a kettle, that in itself would be a major breakthrough", said Frank Arbour.

The BBC Micro now installed at his house has been bought jointly by the local authority and the Greater Manchester Spastics Association.

The Rev Oswald Lloyd-Roberts, director of the Association, said: "Inside Tommy is a lot of speaking. But we can't understand him and he gets very frustrated.

"At last he is going to be able to communicate with people".

The case of Thomas Lindley moved Paul Hartland of Information Technology, the Government-sponsored training scheme involving the disabled, to comment:

"Too many people still think of home computers as games machines. I believe we are now going to see their real value. It is all very exciting".

Soft sales soar

DYNABYTE Software reports steeply rising sales graphs since they attended the Electron and BBC Micro User Show in March.

Although it was their first show, and they had one of the smallest stands, there was a queue to try out the games on their two BBC Micros.

According to sales executive Ian Mortimer business was "extremely busy". Dynabyte plan to be at the Electron and BBC Micro User Show in Manchester this August.

The firm has also had good reactions from customers about new packaging, which bears screen dumps so that games fans can get a better idea of what a game actually looks like when played.

Electronic mail network aids appeal

MICRONET 800 achieved a first using the BBC Micro over Easter when it linked up with Capital Radio in a charity appeal.

The result was that subscribers to the electronic mail network pledged a total of £1,000 to the radio station's "Help a London Child" scheme.

Two or Micronet's staff were on standby at Capital Radio throughout the Easter weekend, armed with a BBC Micro and modem to accept donations.

While the station's disc jockeys were encouraging regular listeners to contribute over the airwaves, the Micronet team were exhorting their own subscribers to take part by regularly posting bulletin boards on the viewdata service's database.

"It was a very successful exercise", said Adam Denning, Micronet's software and technical editor.

"We updated the screen every time we received a pledge in order to keep the interest going".

In the race

ALLIGATA Software of Sheffield is co-sponsoring a racing car this year.

SUPERB REVIEW!

FIRST AID!

DUALSCREEN MONITOR ROM

AID is now clearly established as the finest machine code monitor ROM for the BBC Micro. Designed for beginners and experts, AID is both powerful but still very easy to use. With a comprehensive set of over 40 commands AID will satisfy the demands of the most experienced programmer. Beginners also will soon feel at home with AID's friendly prompts and responses which make it such a good learning aid.

AID can tackle many tasks, from debugging machine code programs to revealing the secrets of machine code games using the unique and highly acclaimed DUALSCREEN graphics feature. Delving into the mysteries of the OS ROM you will find AID a source of lasting interest.

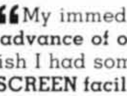
If you are taking your first tentative steps into the world of machine code or planning to write a chart topping machine code game then you can have no finer help than DUALSCREEN AID.

LINCOLN Microsystems
ASSEMBLER INTERACTIVE DEBUG
AID screen selected

Acclaimed by the press and users alike . . .

❝My immediate impression of AID was that it was **a very professional product** . . . AID offers **additional features far in advance of other monitors** . . . I found it easy to use, particularly as the **user guide is very thorough and accurate** . . I wish I had something like this when I first started dabbling in machine code . . . The last facet I explored was the **DUALSCREEN facility, which is perhaps the pearl of the system** . . . In conclusion, **AID seems a must for the serious machine code programmer** and a very useful learning aid for the novice. it is a highly professional product in every way and **could prove to be the standard by which others are compared.**❞ *"The Micro User" January 1984*

❝Having had your AID ROM 'under the bonnet' for two whole weeks I am at last able to escape its fascination in order to say **how delighted I am with it . . .** As a beginner at assembly language programming, I am finding your ROM not only **a very useful tool but also a real revelation,** like having a window into the 6502 and the whole working area of the micro . . . **It is very impressive** and I am grateful that such a powerful facility exists at all . . . I cannot see how such an **impressive feat of programming** as your incredible AID facility can be anything other than a runaway success . . . I would like to add my grateful thanks.❞ *C. Dent, Portsmouth*



CASSETTE – The original cassette version of AID (fewer commands) is still available. Easily transferred to disk. Price £10.00 + p&p for cassette plus 25 page manual.

AID ROM
plus
42 page
user manual

£28

p&p add
UK £1.50
Europe £3.00
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Lincoln Microsystems will consider high quality BBC Electron Software for marketing in the UK and abroad. Advice and assistance is available for promising products. Excellent royalty cash purchase package.

20,000 see the big show

MORE than 20,000 visitors flocked to see the latest Electron and BBC Micro User Show held at the New Horticultural Hall, London, recently – some 2,000 up on the previous event last year.

At one time during the peak day on Saturday, one of the two turnstiles in operation had to be closed to reduce the intake as the large hall was packed to capacity.

And reports of record takings during the four days were received from the majority of the 83 exhibitors who attended the show.

"Naturally we were delighted with the overwhelming success", said a spokesman for Database Publications, organisers of the show.

"For our last show had been held just before Christmas which meant that central London was already swamped with people.

Growing

"To attract even more people to a March show proves that the public's interest in the BBC Micro and Electron – and all the hardware and software being produced for both machines – is growing all the time.

"It certainly justifies our decision to hold five shows a year – just to satisfy the demand".

Because of soaring interest the next London show moves to a much bigger venue – Alexandra Palace in North London.

Put these dates in your diary:

***July 19-22:** Alexandra Palace, London.*

***August 31-September 2:** UMIST, Manchester.*

***October 25-28:** Alexandra Palace, London.*

***December 6-9:** New*

And now it moves to a bigger venue

Horticultural Hall, London.

Meanwhile back at the most recent show, an attempt to play computer games non-stop for 24 hours failed by just 55 minutes when the 14-year-old boy involved dropped off to sleep.

However Derek Creasey, from Stockport, is still eligible for inclusion in the Guinness Book of Records for completing his marathon 23 hours and five minutes ordeal.

The event was held to coincide with the opening of the record-breaking four day show.

"Up until about 20 hours he was going strong", reports one of the organisers.

"But then he developed a headache. So when he finally nodded off we hadn't got the heart to wake him up".

The world record attempt was linked to medical research to establish whether or not prolonged playing of computer games can be harmful.

In order to study this Derek Creasey was hooked up to an ECG machine which monitored his progress throughout.

He was also tested at regular intervals for disorientation, lack of concentration and other possible ill effects.

Provisional results have given the current computer games craze the all clear.

"During the attempt he showed no obvious signs of stress at all", said a medical observer.

"In fact the only symptom he displayed was what anyone else would have shown after 23 hours and five minutes non-stop doing anything – and that was just plain old fashioned tiredness".

Video training via BBC micro

THE Department of Trade and Industry is putting £100,000 into a project to produce an educational video system based partly on the BBC Micro.

It will train microelectronics technicians at the college run by the electricians' trade union, which is also putting cash into the scheme.

The idea is to combine unchanging information held on a laser video disc with volatile information stored on a BBC Micro.

The video disc will hold a mixture of still frames, live action and stock footage. Computer graphics will represent electronic circuits for fault diagnosis.

The system will go on sale to industry and training institutions next year.

According to Eric Parsloe, whose company, Epic Industrial Communications is setting up the system, it will provide a low cost solution to a major industrial training and productivity problem.

In addition it should help give the UK the lead over other countries.

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Contest for prep school pupils

PUPILS in preparatory schools are to have their own national computing contest, based on the BBC Micro.

The competition – the first of its kind – is being run by Satips, the Society of Assistants Teaching in Preparatory Schools.

Contestants can submit either educational programs or games for two contests, one for under 11s and another for over 11s.

All programs, maximum 75 lines, must be original and bug-free. They must be submitted via a Satips member of school staff.

The entry fee is £1 for each program and the closing date is December 1. Prizes are not yet finalised.

Full details are available from the organiser, Robert Robson, who teaches science at a Norwich prep school. (Tel: 0603 868982).

Bibby on Basic

MIKE Bibby, Features Editor of *Micro User*, will be running a weekend course in BBC Basic for absolute beginners in July.

The course will be held at the University of Manchester's Holly Royde College. Starting at 6.45pm on Friday, July 6, it lasts until 4pm the following Sunday.

"The idea is to follow the same style I use in my beginners articles", said Mike, already an experienced lecturer on beginners Basic for the extra-mural department of the university.

"We'll be starting at the very beginning and building up slowly from there, learning good programming techniques as we explore Basic.

"The aim is that by the end of the weekend even those who knew nothing about the micro will have a thorough grounding in BBC Basic".

ELECTRONIC CLASSROOM 1
SYMBIOTIC RULES OK!

Electronic classroom takes its bow

THE classroom of the future took a bow at the Electron and BBC Micro User Show – and in doing so fueled the controversial debate about the future role of teachers.

"We set out to be provocative and succeeded", said Peter Brameld, of Database Publications, one of the joint organisers of the electronic classroom stand.

"Many teachers and theorists are worried that the computer will eventually replace the teacher in the classroom and that pupils will develop learning relationships with software programs and not with their teachers", he said.

"We wanted to bring these fears into the open for proper discussion, and to support the idea that computers should be used simply as a valuable teaching tool or aid to complement a teacher's activities".

The Electronic Classroom featured 10 BBC Micros linked to the Symbnet local area network from Symbiotic Computer Systems.

The system was first developed for Apple computers, and has many similarities to the professional network used in a business environment.

Message switching allows a supervisor to send messages to individual users, to groups or to all users of the network.

Project identities are allotted to users and these can be used as addresses for messages to various groups of people.

The messages are stored on disc until they are acknowledged or collected.

A password facility means it is possible to keep information confidential when required.

A major feature is that expensive peripherals such as disc drives and printers can be shared between micros.

And use of fibre optic cables means the maximum distance between any two computers on the system is nine kilometers.

This is particularly useful for universities or colleges of further education where resources and departments are often split over several locations.

The BBC Symbnet will run Acorn DFS software without modification and DFS ROMs are not required, say Symbiotic. It is also compatible with the tube.

Econet 2, the enhanced version of Acorn's networking system, is due for release next month.

It will be demonstrated at the next Electron and BBC Micro User Show to be held in London's Alexandra Palace.

GOING BANANAS OVER BEEB

THE Windward Islanders have gone bananas over the BBC Micro.

The machines, supplied by Broadway Electronics of Bedford, will be used to reorganise stock control for the Caribbean islands' main crop – bananas.

More than £2,500 worth of equipment, based around the BBC Micro and Broadway's own disc drives, have been flown out, following an order handled by the Crown Agents.

A specially insulated crate was used to protect the equipment from the tropical heat during transit.

How did this British company land an order from half-way around the world?

The Windward Islands Banana Growers Association in St Lucia was put into contact with them via the Agricultural Research Council and the National Institute of Agricultural Engineering, which is also a client of the computer company.

Paul Vaughan, Broadway's MD, said: "This order illustrates the versatility of the BBC Micro".

ROM based software takes off

FIRMWARE – software stored on a ROM chip – is becoming standard for serious programs for the BBC Micro.

This is so much so that in many cases the available sockets inside the BBC Micro have been used up and enthusiasts have turned to ROM expansion boards in order to fit all their chips.

Watford Electronics, one of the leading firms selling ROM-based software, has issued a new 13 ROM expansion board for the BBC Micro.

The firm has also produced enough utility chips to fill all 13 sockets.

As well as the Watford DFS and the Beebmon machine code monitor, written by Andrew Bray of The Advanced User Guide fame, the firm has produced two new graphics screen dump chips.

The first, Dump Out 2, is a machine code hi-res screen dump ROM for a wide range of printers.

The second chip, the Epson Dump ROM, is designed specifically for Epson RX and FX printers, allowing teletext graphics as well as multitone screen dumps.

Watford is also entering the micro communications revolution with its Termemu terminal emulator ROM for the BBC Micro and its Prestel Interface ROM.

Computer Concepts, already well known for the Wordwise word processor, is also expanding its range of firmware.

In addition to the graphics ROM and the Printmaster printer utility, it has released Caretaker, a Basic utility ROM.

Among other things Caretaker will allow the Basic programmer to recover a crashed or corrupted program and selectively renumber and/or save parts of a program.

It also allows the use of single key entry of keywords.

Also planned for release – when the ROM chips are available – is the Accelerator, Computer Concepts' long-awaited BBC Basic compiler.

This is claimed to be the first full floating-point compiler available for the BBC Micro.

Acorn in laser disc drives deal

ACORN is to take part in a joint venture to manufacture laser disc drives in Hong Kong.

The company has reached agreement with BSR International to set up a new manufacturing operation under the name of Optical Information Systems in the Crown Colony.

A joint statement was released by Hermann Hauser, Acorn's chairman, and W.R.A. Wyllie, chairman of BSR International after the conclusion of successful talks in Hong Kong.

Reliability

Optical Information Systems' first product will be a compact laser disc drive which, claim the makers, will feature greater storage capacity, reliability and faster access times than currently available with floppy and hard discs.

This is in line with the new company's long term strategy to develop digital optical technology for computer data storage and retrieval.

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HEARD ON THE GRAPEVINE..

ALREADY known for its disc drives and the Amcom DFS, Pace has entered the rapidly growing field of micro communications with the Grapevine modem.

The low-cost hard wired device plugs directly into the telephone system by way of a standard jackplug.

It is capable of operating at 300/300 baud full duplex and also 1200/75 baud, the Prestel rate.

This means that using the Grapevine and suitable software, BBC Micro owners can access Prestel databases.

They can also use bulletin boards such as *The Micro User's* own Microweb.

It can even go international, as it supports both the European and American transmission frequencies.

Pace is also supplying ROM-based software to work with modems such as the Grapevine in the form of Commstar.

This "drives" the modem, effectively turning the BBC Micro into a terminal with access to databases and bulletin boards throughout the world.

Hints for Hobbit fans

GOOD news for adventure fans who find The Hobbit habit forming but can't get there and back again.

Melbourne House has published "A Guide to Playing the Hobbit" by David Elkan. It is the first time that a guide has been published for a BBC Micro adventure.

In three increasingly easy stages the reader is taken through the program's problems and pitfalls, with hints and explanations given as necessary. As the game is different every time it is played, the guide is not a unique solution to the program, more a manual of strategy.

Race on for Z80 second processor

UPGRADE Technology is running neck and neck with Acorn in the race to launch a Z80 second processor for the BBC Micro.

As *The Micro User* went to press, it was clear that only a day or two separated the two companies.

Upgrade's commercial director Steve Matthews said: "Although not the first Z80 second processor to hit the market, ours has many advantages over the others".

Upgrade's product, which will be available first from northern dealers, has its own built in power supply and is a completely plug-in unit.

It has an internal disc controller, so does not rely on the micro having a DFS, and is suitable for either model A or B.

The disc controller will handle two drives, which can be easily and independently installed by the user via a software utility.

The unit also includes an expansion bus that allows the user to plug in up to three add-on boards.

These will expand the unit's RAM from 64k to 256k, adding serial, parallel or IEEE interfaces, extra hard disc storage or stereo sound synthesis.

The Acorn product, though different in detail, is understood to be largely similar. It costs about £100 more, but this is offset by a large amount of bundled software.

Acorn's deal includes free office productivity programs – word processing, spreadsheet, database and graphics – a system generator for application software, plus CIS Cobol, Professional Basic and BBC Basic.

OLYMPICS ON BBC MICRO

THE BBC Micro has been programmed to simulate the world's best athletes in the main track and field events which feature in the Olympic Games.

In all cases – allowing for a slight random element – the computer achieves the current world record.

Ranging from the 100 metres to the hammer throw, it is accurate in all details from times to distances.

The games program package involved – called Micro Olympics – has taken several months to write due to the complexities involved.

Players attempt to beat the computer and so establish a world record of their own.

- **See special offer on Page 79.**

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CARRIAGE COSTS – Micro's, Monitors, Disc Drives, Printers, Desks £7
Books, Cassette Decks, Leads, Software 50p each item.

BARCLAYCARD VISA

ACCESS, BARCLAYCARD VISA ORDERS WELCOME

CREDIT FACILITIES

Instant credit up to £1,000. Deposit 10%.

B6

Watford Electronics

Dept. BBC, CARDIFF ROAD, WATFORD, HERTS. ENGLAND.
Tel: Watford (0923) 40588/37774 Telex: 8956095 WAELEC

BBC MICROCOMPUTER

Model A—£260; Model B—£346

Upgrade your Model A with our Upgrade Kits and save yourself £ s s s

● BBC1 16K Memory (8 x 4816AP-3 100nS)	£24.00
● BBC2 Printer User I/O Port	£8.10
● BBC3 Disc Interface Kit	£95.00
● BBC4 Analogue I/O Kit	£8.25
● BBC6 Expansion Bus Kit	£7.75
● Complete Mod. A to B Upgrade Kit	

ELECTRON MICROCOMPUTER

£199 (incl. VAT)

Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies. **£3.50**

SEIKOSHA GP100A PRINTER

10" Tractor Feed, 80 columns, 50CPS. Normal & Double width Char, Dot res graphics. Parallel Interface standard.

SPECIAL OFFER Only: **£144**

INTERFACE CABLE

BBC to Seikosha Cable **£7**

FRICTION FEED

Attachment for GP100A or 250X Printers **£28**

GP-700 Colour Printer **Screen-dump** routine in **ROM FOR BBC** Micro

£12

RX80

100 CPS, 9 x 9 matrix, dot addressable graphics, condensed and double width printing. Normal, Italic and Elite Graphics. Tractor feed, 10" max width, bi-directional, logic seeking. Centronics Interface standard.

ONLY **£235** (£7 carr.)

EPSON RX80 F/T PRINTER

As above but has both Friction and Tractor Feed. £259 (£7 carr. Securicor)

PRINTER INTERFACE BUFFER

Neatly packaged self contained box, supplied complete with all leads, manual and detachable power supply.

Price: 16K Unit	**£99**
Price: 48K Unit	**£135**

Epson FX80 Printer

160 CPS, 11 x 9 matrix, proportional spacing, superscripts, subscripts, dot addressable graphics. Normal, Italic and Elite characters. Up to 256 user definable characters. Down loadable character set. Condensed and double width printing. Full proportional spacing. Four user defined margin positions. Tractor and Friction feed. 10" maximum width Bi-directional, logic seeking Centronics interface standard.

ONLY **£324** (£7 carr.)

Epson FX100 Printer

Same as FX80 but has a 15" wide Carriage **£495**

Type	Ribbons	Dust Covers
MX80FT	£4.75	£4.50
MX100/FX100	£10.00	£5.25
FX80	£4.75	£4.95
RX80	£4.75	£4.50
GP80	£4.50	—
GP100	£4.95	£3.95
GP250	£5.95	£3.95
GP700	£18.50	—

RX & FX PRINTER INTERFACES

RS232	£35	RS232 + 2K Buffer	£59
IEEE 488	£65	2K Parallel	£58

BROTHER HR-15

DAISY-WHEEL PRINTER

An exceptionally high quality daisy wheel printer at the price of a dot matrix printer. 18CPS; bi-directional, 3K of buffer; has clear buffer facility, carriage skip movement, proportional spacing; underlining; bold print and shadow print. Prints in two colours; super and subscript facility. Impact control facility to vary pressure on paper for making carbon copies. Has Centronics parallel or RS-232 interface. Connects directly to BBC Micro. A ribbon cassette plus a separate red ribbon. Optional extras: single sheet feeder takes up to 150 A4 sheets; a keyboard that transforms HR15 into a sophisticated electronics typewriter. Attractively finished in beige.

ONLY **£349**

Single Sheet Feeder	**£199**
Keyboard	**£150**

Ribbon **£3;** Daisy Wheel **£18**

LISTING PAPER (Plain)

1,000 Sheets 9½" Fanfold Paper	£7
1,000 Sheets 15" Fanfold Paper	£9
Teleprinter Roll (Econo paper)	£4

PRINTER LABELS (continuous stationery)

1,000 90 x 36mm	£5.50
1,000 90 x 49mm	£7.75
1,000 102 x 36mm	£6.25

Carriage on Printer Paper or Labels £1.50

PRINTER LEAD 36"

Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, etc., Printers.

ONLY £7

Special Extra long 5 feet Cable **£10**

BBC Micro WORD-PROCESSING PACKAGE

A complete word processing package consisting of: BBC Model B, Zenith 12" Green or Amber Monitor, Twin 200K highly reliable (1 year warranty) Teac Disc Drives in matching beige colour, the popular WORDWISE word processor, Watford's own highly sophisticated 62 File DFS interface fitted, the world renowned Brother HR15 Daisy Wheel Printer, Gemini's Beebplot & Beebcalc Spreadsheet Analysis Software discs, 10 blank diskettes, 500 sheets of fan-fold paper. Manuals and all the leads. To enable you to carry your Micro around, we shall pack it in our Antique Brown leatherette Attache carrying case.

ONLY **£1,275** (carr. £15)

(P.S. We will alter the package to suit your requirement. Call in for a demonstration).

NEW

KAGA KP810

This new JAPANESE printer has EPSON FX/RX compatible commands. 140 CPS Dot matrix Printer, offers **NEAR LETTER QUALITY** printing. 9 x 9 matrix. Friction feed, Adjustable tractor feed, Single sheet feed and built-in Paper Roll Holder. Normal, Italic, Enlarged, Condensed, Super and Subscript, Dot addressable graphics (8, 9 and 16 pin modes). Proportional spacing. (Optional extra: Down loadable character set in 8K ROM or RAM). NEAR LETTER QUALITY print, selectable at switch on. 10" maximum width, bi-directional, logic seeking. 3K Buffer. Half speed quiet mode. Convenient Paper-out sensor switch. Centronics Interface standard. All this plus our no quibble 12 months warranty.

Special Introductory Offer: ONLY **£269**

KAGA KP910 PRINTER

Similar features as the above KP810 printer but has extra wide carriage. Will accept upto 17" maximum width paper. 156 column normal and 265 column condensed.

ONLY: **£349**

AMS 3" DISC DRIVES

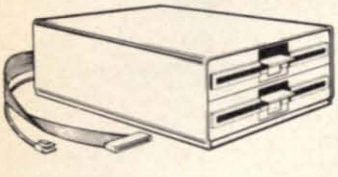
These popular mini disc drives, now available from WATFORD. For details see AMS advert in this magazine. Supplied complete with cables, manual and utilities disc.

Single 100K per side	£163
Twin 200K per side	£320

DISC DRIVES CASED WITH CABLES (less PSU)

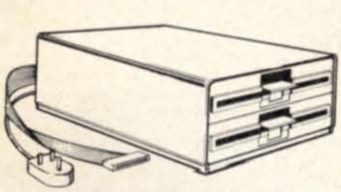
(All Drives are NEW SLIM-LINE Type)

NEW LOW PRICES



- **CLS 100** Single, TEC Single sided 40 track 100K, 5¼" Disc Drive **£129**
- **CLS400** Single, Mitsubishi Double sided 80 track 400K, 5¼" Disc Drive **£188**
- **CLS400S** Single, Mitsubishi Double sided 40/80 track Switchable, 400K, 5¼" Disc Drive **£215**
- **CLD200** TEC Single sided 40 track 200K, twin 5¼" Drives **£252**
- **CLD800** Mitsubishi Double sided 80 track 800K, 5¼" TWIN Drives **£365**
- **CLD800S** Mitsubishi Double sided 40/80 track switchable, 800K, Drives **£399**

(CUMANA) DRIVES CASED WITH PSU & CABLES



- **CS100** TEC Single sided 40 track 100K 5¼" Single Disc Drive **£145**
- **CS200** TEC Single sided 80 track 200K 5¼" Single Disc Drive **£210**
- **CS400** Mitsubishi Double sided 80 track 400K 5¼" Single Drive **£259**
- **CS400S** Mitsubishi Double sided 40/80 track 400K 5¼" Single Drive **£340**
- **CD200** TEC Single sided 40 track 200K 5¼" TWIN Disc Drives **£275**
- **CD400** TEC Single sided 40 track 200K 5¼" TWIN Disc Drives **£365**
- **CD800** Mitsubishi Double sided 80 track 800K 5¼" TWIN Drives **£425**
- **CD800S** Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives **£465**
- SPARE DRIVE CABLES, SINGLE **£6;** DUAL **£9**
- DFS Manual (comprehensive) **£7.50** (No VAT)

P.S.

1. You do not require Formatting Discs when using our DFS as the formatting program is in the ROM, nor do you require expensive 40/80 track switchable drives as with our DFS you can read and write 40 and 80 track discs in an 80 track drive (software switchable).

2. **MITSUBISHI** SLIMLINE DISC DRIVES that we supply are Double Sided, Double Density 5¼", 1 Megabyte. (With BBC Micro 400K after formatting.) When used in conjunction with Double Density board one obtains 800K (approx) after formatting. Track density 96 TPI, track to track access time 3mSec. These drives are very fast, quiet and efficient. We strongly recommend their use.

5¼" DISKETTES

(Lifetime warranty)

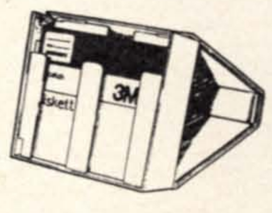
Why settle for less, Buy the best.

- 10 Verbatim or 3M Diskettes S/S D/D **£17**
- 10 Verbatim or 3M Diskettes D/S D/D **£27**

DISC ALBUMS

Attractively finished in beige leatherlook vinyl. Stores, protects and displays 20 discs in double-sided clear view pockets. ONLY **£4.95**

PLASTIC LIBRARY CASES



for Disc Storage 5¼" (holds 10) **£2**

LOCKABLE STORAGE UNITS

Attractively finished, strong beige plastic base fitted with dividers. Smoke acrylic top. Supplied with adhesive title strips for ease of filing.

- M-35 Holds upton 35 mini discs **£16**
- M-85 Holds upto 85 mini discs **£20**

FLOPPY HEAD CLEANERS

Unless your office/home is dust free, you should clean heads at least once a week to avoid the risk of cross contamination.

Simply apply the cleaner to one of the specially formulated cleaning discs, insert into the drive and initialise. If your system has no initialisation program then insert the disc and open and close the door 5 times.

£16.00

READY-MADE LEADS

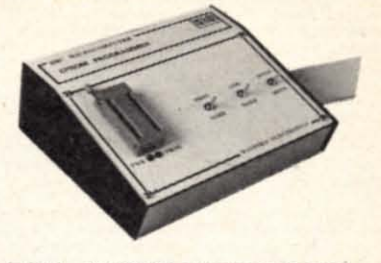
CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**
Monitor Lead, BNC to PHONO	**£3.00**

Disc Drive to BBC Micro Power Lead Single: **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	**Sockets**
RGB (6 PIN DIN)	**30p**	**45p**
RS423 (5 pin Domino)	**40p**	**50p**
Cassette (7 pin DIN)	**25p**	**65p**
ECONET (5 pin DIN)	**20p**	**30p**
Paddles) 15 pin 'D')	**110p**	**215p**
BBC Power Plug 6 way	**75p**	–
Disc Drive Plug 4 way	**70p**	–

EPROM PROGRAMMER for BBC MICRO



At last! – the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMS from 2K bytes up to 16K bytes – **2716 — 2516 — 2532 — 2564 — 2764 — 27128.**

This extremely powerful system is designed for your needs of TODAY & TOMORROW! – BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:

- **COMPLETELY SELF CONTAINED –** Housed in its own sturdy case – Uses its own power supply – connects directly to the 1MHz Bus – Simple and Safe!
- **FULL SOFTWARE SUPPORT –** Comes complete with simple to use fully machine code ROM based software and easy to understand manual. Facilities include Verification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! – This software does not simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.
- **ACORN BUS COMPATIBLE –** Use of the 1MHz connection complies with all Acorn addressing recommendations – That means you can still add-on such things as the TELETEXT, IEEE 488 TUBE and PRESTEL
- Allows more than one program to reside in an EPROM using the ROM Filing System.

ONLY **£79** incl. Manual (£3 carr)

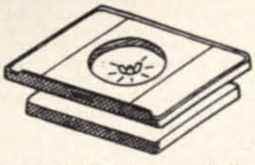
MONITORS

MICROVITEC 1431
14" Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **Special Offer £179**

- **MICROVITEC 1451** Hi-res 14" Monitor incl. lead **£295**
- **NEW MICROVITEC 14"** Colour Monitor/Composite Video **£249**
- **KAGA RGB** 12" Medium Resolution Colour **£195**
- **KAGA RGB** 12" High Resolution Colour **£259**
- **KAGA** 12" Standard resolution colour MONITOR/COMPOSITE VIDEO **ONLY £195**
- **BNC** Connecting Lead **£3**
- **RGB** Connecting Lead **£5**
- **ZENITH 12"** High resolution, jitter free picture, Amber or Green **£75**

Carriage on Monitors £7 (Securicor)

SWIVEL MONITOR BASE



Attractively finished in beige, our swivel base allows you to tilt/swivel your Monitor to any required angle for comfortable viewing.

ONLY **£18**

Continued →

NEW
Mk II 13 ROM SOCKET BOARD

Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. This board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, etc. (At Watford, we think ahead.)

Our 13 ROM SOCKETS BOARD enables the **User to increase the Sideways ROM capacity** the basic four sockets on the main board upto the full SIXTEEN capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

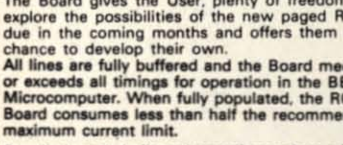
ONLY £32.50 (carr. £1)

EPROMs & CMOS RAMs for BBC MICRO

2764-250nS (8K ROM)	**£5.95**
27128-250nS (16K ROM)	**£24.00**
6116-150nS (2K RAM)	**£5.75**
6264-150nS (8K RAM)	**£36.00**

BEEB SPEECH SYNTHESISER

VERSATILE SPEECH SYNTHESISER
UNIT FOR THE BBC
MICROCOMPUTER



Watford Electronic's very own Speech System. Specially designed so that even a novice can make his BBC talk:-

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!
PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!
BUILT-in Library of approximately 500 words to get you started.
ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.
EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!
COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxillary output socket provided for direct connection to an external amplifier.
HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

Only £44

THE ULTIMATE DFS FOR BBC MICRO

by

Watford Electronics

Highly acclaimed at The ACORN and BBC MICRO USER Shows. What do the independent press say?

Good value for money – *Beebug Aug. '83*
A very worthwhile package – *The Micro User*
You'll be buying a very powerful package – *Personal Computer News*
Superior DFS; Excellent disc sector editor – *Computer Answers*

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

- The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.

- A FORMATTING PROGRAM is built in, permitting formatting to 35, 40, 80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.

- A DISC VERIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.

- A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidently deleted files and can save weeks of work.

- A double step mode allows the User of 80 TRACK DRIVES TO READ & WRITE BOTH 40 and 80 TRACK DISCS. This mode is software selected for each drive individually, thus enabling a 40 track disc to be copied on to an 80 track very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE 40/80 TRACK SWITCHABLE DRIVES.

- A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.

- When using LOAD, CHAIN, etc, it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.

- Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1100, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K75 long.

- An advanced COPY command is included which will prompt the user, requesting whether to copy each file.

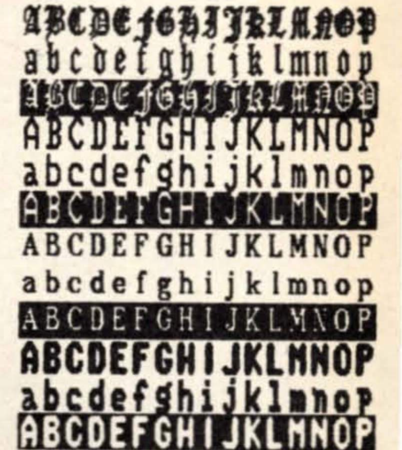
- RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.

- OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.

Continued:

BEEBFONT ROM

BEEBFONT is a remarkable new concept in BBC software, exclusively available from Watford. Once fitted, the 16K ROM will enable you to produce attractive text displays in following different styles:



★ **It works in modes 0, 1, 2, 4, using full colour.**
★ Simply use Ctrl–V to select the font and all further screen output will be in a new style.
★ Even the ordinary Beeb character set can be enhanced by doubling height or width and emphasising to give bold print.
★ A comprehensive editor is included which enables the user to design his own characters.
★ A spooling program is provided, which enables pre-formatted text files to be displayed on an EPSON FX, RX, and NEC Printers, using the full range of character styles. (Please specify printer type when ordering). Can be used with WORDWISE.
★ This really must be one of the most original and exciting products of the year.
★ A twenty page manual is provided and the demo/editor software comes on disc or cassette (please specify when ordering). **ONLY £39**

DFS continued:

- 2K of RAM can be reclaimed from the DFS by setting "PAGE" to & 1100.

Now with extra features:

- The powerful library system has been extended so that libraries now work on all accesses not only *RUN. This allows you to have a utility directory with all your commonly used programs without muddling in your current workfiles. Very useful for BCPL User.

- Programs can now reside lower in memory by reclaiming some of the DFS' workspaces, indeed PAGE can be taken as low as £1100 under most circumstances.

- To make DFS easy to use, wild cards ("*") have been made vastly powerful, e.g. *INFO *A* gives information on all files in the current directory which have an "A" anywhere at all in their filename.

- Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

- Fully compatible with BBC TELETEX and TORCH Systems.

DFS ROM ONLY **£29**
Complete Disc Interface Kit including DFS ROM and fitting instructions. P.O.A.
Comprehensive and clearly written DFS Manual. **£7.50 (No VAT)**
P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for the highly sophisticated Watford's DFS ROM for **ONLY £25**
Watford's DFS is exclusively available from Watford Electronics. We DO NOT retail through any Dealers.

WATFORD'S BEEB PRINTER ROM

"Makes Printing Childs Play"

Are you fed up with not being able to unravel your printer manual and use all those features you paid for? Need sensible paging for use in the creation of booklets? Then you certainly need our Beeb Printer ROM.

A machine code printer utility in ROM.

- 'Single' key operations replace control code sequences for underline, font and size selection, paper movement, etc. Up to 30 come pre-defined, without effecting normal fn key usage.
- **This rom allows easy control of your printer from 'Within' WORDWISE text. Instead of long escape sequences, you just 'OC' a single number to Select, Underline, Print Styles, etc.**
- Automatic fanfold page margins. Puts gaps in listings. PRINTed text etc to skip the folds. The gap size alternates to minimise paper wastage when using binders.
- Form feed and related commands, made available on ALL printers. Can also provide a left margin.
- User defined characters embedded within text are printed as on VDU.
- ★ Commands select option for GP100, STAR, NEC, MX/FX, LP VII/DMP100, DMP200. Operates with Parallel and Serial Printers.
- Fully functional with the popular WORDWISE wordprocessor.

Supplied complete with a comprehensive 50 page manual.

Price: £24

(When ordering, please specify printer type)

SPECIAL OFFER

Buy BEEB PRINTER ROM and any one of the two SCREEN DUMP ROMS for

ONLY: £33 (A saving of **£7+**)

TWO GRAPHICS SCREEN DUMP ROMS

DUMP OUT 2

A versatile machine code hi-res Screen Dump ROM.

- You can now have small or large 2 tone dumps and multi-tone 'colour' pattern dumps (8 distinct mode 2 shades) on every printer.
- *Commands initiate the required dump optional parameters may be included for colour masking and selecting the part of the screen to be dumped.
- Clever use of the processor stack means that no workspace is required! (Multitone dumps also use 2 zero page locations.)
- For GP80/100/250, STAR, NEC, EPSON MX/RX/FX, LPVII, DMP100/120/200/400.
- Screen modes 0, 1, 2, 4, & 5.
- Instruction Manual

All this for ONLY **£15**

EPSON DUMP ROM

A specially designed Dump ROM for EPSON RX, FX and the new Kaga KP810 Printers. Will accurately DUMP all Screen modes including TELETEXT, GRAPHICS and DOUBLE HEIGHT. MULTITONE DUMPS are also supported. Simple single command (*SCDUMP) operation.

Only: £16

WATFORD JOINS THE COMMUNICATION REVOLUTION

MODEM 84

Prestel

A British Telecom Service.

With the launch of Watford's MODEM 84 you can now hook into PRESTEL, MICRONET, HOMELINK, TELECOM GOLD, etc., for about the cost of a good tape recorder. Prestel gives you access to an incomparable database covering almost every subject under the Sun. There is Micronet with lots of free programs that you can download and run. Details of Clubs and User groups, a diary of meetings and exhibitions, news and reviews, technical information, etc. There is Homelink with On-line banking. And there is armchair shopping, travel information, Entertainment, World News, Sports News, Business News, Weather information, Electronic mail and lots more. The basic Prestel subscription is only £5 per quarter for domestic user and at off-peak times there is no charge for access time. Can you afford not to be part of this revolution?

Now using the latest techniques and the new generation of Modem chips, Watford have developed a Modem that is newer, better and yet cheaper than any on the market.

Compare the Specifications:

MODEM

- Direct-connect Modem using BT approved isolation components.
- Full Duplex V23 operation for Prestel and TELECOM GOLD operation (1200/75 Baud).
- User-to-User half duplex 1200/1200 Baud operation with AUTOMATIC SEND/RECEIVE switch (BEWARE – most MODEMS switch manually between send and receive, which precludes the use of intelligent user-to-user software).
- Simple single button operation and comprehensive LED status display.
- Attractive Beige case to match your Micro. Sized to sit on the disc drive.

(P.S. BT approval applied for).

NEW SUPER PRESTEL INTERFACE ROM

Fully compatible with Watford's MODEM 84 as well as with PRISM and most other Modems.

- Supports full Prestel Colour Alpha and Graphic Characters including Double Height, Flashing, Conceal/Reveal.
- Called by simple *PRESTEL command. Disc and Tape configurations fully supported.
- Telesoftware downloader included.
- Comprehensive MAILBOX facilities including offline editor.
- Auto Logon sequence, can be burnt into ROM if desired.
- Unique "TAG" facility allows tagging and recall of interesting pages – avoids the common and annoying 'NOW WHERE WAS THAT PAGE' problem.
- Page load and save to tape or disc. Pages are automatically saved under Page Number reference in a 'FRAME' directory.
- Print page options are ASCII only (i.e. with supression of Graphics) – fast and works with any printer – as well as a full graphics dump for the popular Epson printer.
- 'USER' function call built into interface with specialist add-on routines (your own as well as ours).
- All the above facilities available from Function Keys. An overlay is provided giving simple yet comprehensive guidance to the key functions.
- Comprehensive instruction manual supplied.

PRICES:

SOFTWARE in ROM incl. Comprehensive MANUAL ONLY: £25

MODEM 84, SOFTWARE in ROM & Operating MANUAL ONLY: £75 (carr. £1.50)

(Please allow upto 28 days for delivery)

Coming soon:
BEEB User-to-User ROM. For automatic user-to-user communication including file/program transfer. (Requires Watford's MODEM 84 or PRISM 2000).

Please write to Watford Electronics for full details, Order and Application Forms.

NEW

FX80 PRINTER DRIVER for VIEW

Do you want to use Italics or Enlarged Characters with View? French or German Characters? These and other FONTS from FX80 character sets can be accessed using our Printer Driver with VIEW. The disc contains an example as well shows how to use. Available on 40 or 80 track Disc. **ONLY: £7.50**

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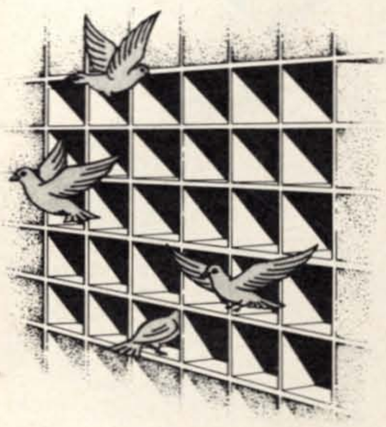

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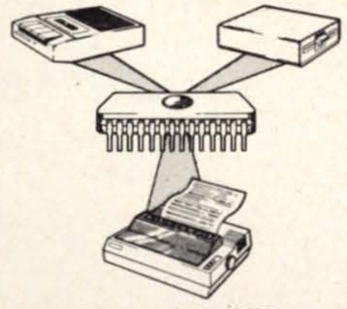

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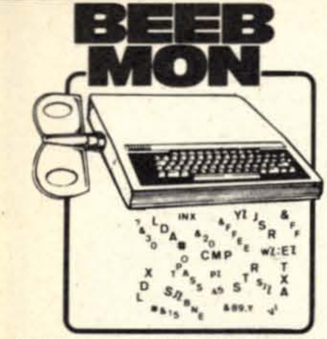

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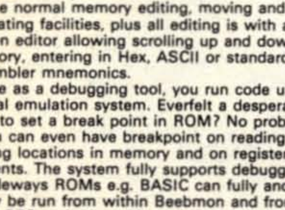

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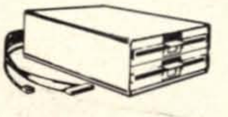

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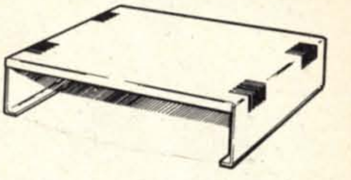

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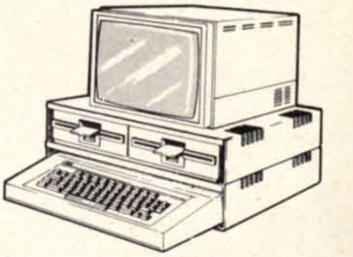

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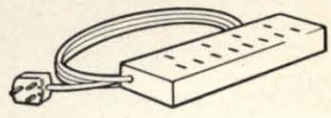

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Part 14 of MIKE BIBBY'S introduction to programming

Type your PROC names with care, for a boob can drive you berserk

WE'LL start off this month by recapping about procedures. I know we mentioned some of this last month, but procedures cause some people headaches.

It's not that they're difficult, it's just that you have to keep looking somewhere else to see what the micro is doing!

Anyway, a procedure consists of several lines of code that you want to use repeatedly in a program. The idea is that instead of typing out virtually identical lines with just the line numbers altered, you call the procedure at relevant points in the program.

To do this you have first of all to define the procedure – that is, tell the computer what you expect it to do when you call the procedure.

The first step is to give the procedure a name, in much the same way as a variable.

```
 10 REM PROGRAM I
 20 MODE 6
 30 REPEAT
 40 INPUT"A word",word$
 50 PROCprint
 60 UNTIL 0
 70 REM ================
 80 DEF PROCprint
 90 PRINT''"The word was "word$''
100 ENDPROC
```

In Program I line 80 does this with:

```
80 DEF PROCprint
```

This tells the micro that the next few lines are the "actions" it is to perform when it encounters a reference to PROCprint.

In this case it has only one thing to do – print out the word you had previously input. It's all rather trivial, but it illustrates the point.

At the end of a procedure we're defining we must include an ENDPROC so the micro knows that that procedure is over (line 100).

What happens in Program I is that, as soon as the micro has the word it prompted for (line 40), it encounters line 50 which reads:

```
PROCprint
```

The micro looks to where PROCprint is defined in its memory and carries out the lines of code it finds there until it meets an ENDPROC. It then returns to the program where it left off.

On the next occasion it meets a PROCprint it will again carry the procedure out, and then continue from where it got up to in the main program.

Notice, it carries on from where it got up to. Enter this new line 30:

```
30 PROCprint:PRINT"I'm at the second
part of line 30"
```

What we've done here is to put two statements on the same line – which we can do if we separate them with a colon.

If you run the program now you'll notice that after doing PROCprint it carries on from exactly where it left off, and does the second half of line 30.

It does not simply carry on with the next line. It's far cleverer than that.

Now for something else. Change line 50 to:

```
50 PROCPRINT
```

and line 80 to:

```
80 DEF PROCPRINT
```

then run it and see what happens.

You might have been expecting the BBC Micro to refuse to accept PROCprint since PRINT is a Basic keyword. After all, it won't accept a line like:

```
PRINT=6
```

or:

```
PRINTA=6
```

However you can get away with it in procedures, but I don't encourage it – sticking to lower case procedure names is far clearer.

Change line 80 back to:

```
80 DEF PROCprint
```

When you run it you'll get:

```
No such FN/PROC at line 50
```

which is right since the procedure now doesn't match up with its definition.

It's all too easy to do something daft like this when you're programming, and amazingly difficult to spot.

It is the sort of thing that infuriates people typing in listings. You see you might have typed in line 50 perfectly but mistyped the procedure name later on,

→

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From Page 43

where it's defined (or rather, it's supposed to be defined).

However the error message points to the line at which the procedure was called – not to the definition where your error was.

Of course the micro is right. There is no such procedure because of your mistyping and it can't guess what you intended to type.

Notwithstanding, it can still drive you berserk in the wee small hours.

So the moral is: If you get an error message in a line concerning a procedure don't just check that line, but have a look at where the procedure is defined as well.

Now have a look at Program II.

```
 10 REM PROGRAM II
 20 MODE 6
 30 REPEAT
 40 INPUT"A word",word$
 50 PROCprint(word$)
 60 UNTIL 0
 70 REM ==============
 80 DEF PROCprint( string$)
 90 PRINT''"The word was "string$''
100 ENDPROC
```

This does exactly the same as Program I but accomplishes it by *passing parameters* to the procedure.

In practice this means that the value of the variable held in brackets when we called the procedure – *word$* – is transferred to the variable in brackets in the procedure definition – in this case *string$*.

We did much the same last month, except that we used numbers rather than strings. And we didn't put a variable inside the brackets of the calling procedure, we just put the number we wanted to pass to the procedure.

Now to continue our investigation of things that go wrong with procedures change line 80 to:

```
80 DEF PROCprint(string)
```

That is, leave the $ off *string$*.

When you run it you'll get the message "Arguments at line 50".

This isn't anything to do with your present mood. Arguments are the things within the brackets and they have to match up – strings to strings, numerics to numerics.

In this case you have deliberately set it up so that you're passing a string variable *(word$)* to a numeric variable *(string)* and the micro doesn't like it.

Again, the error message points to line 50 where the procedure is called – although the "mistake" was actually in line 80, where it's defined. Take note!

You're not restricted to passing just one parameter to a procedure. Take a look at Program III.

```
 10 REM PROGRAM III
 20 MODE 5
 30 REPEAT
 40 INPUT"A word",word$
 50 INPUT"Colour",shade
 60 PROCprint( word$ ,shade)
 70 UNTIL 0
 80 REM ==============
 90 DEF PROCprint( string$, colour)
100 COLOUR colour
110 PRINT''string$''
120 ENDPROC
```

Here there are two variables within the brackets of the procedure definition.

In this case one is a string which holds the word we want printing. The other is a numeric, holding the logical colour we want the text to appear on the screen in. *(We've changed to Mode 5.)*

When you run it you'll see that the value of *word$* is passed to *string$* and *shade* is passed to *colour.*

It is important that you hand the variables over so that a string is passed to a string variable, a numeric to a numeric and so on.

To see this, alter line 90 to:

```
90 DEF PROCprint( colour, string$)
```

and you'll get the message "Arguments at line 50".

This is because you are trying to pass values to variables of the wrong type. The micro takes the first variable from within the brackets of the procedure call and tries to pass it to the first variable within the brackets of the procedure definition.

❛It is important that you hand the variables over so that a string is passed to a string variable, a numeric to a numeric..❜

It then tries to hand on the second variable within the call to the second in the procedure definition and so on. If they don't match up there are problems.

By now you won't need reminding that the line number in the error message might be a bit misleading.

Finally, have a look at Program IV. We've extended the parameters passed to include the line and column that the string you enter is printed at.

```
   10 REM PROGRAM IV
   20 MODE 5
   30 REPEAT
   40 INPUT"A word",word$
   50 INPUT"Colour",shade
   60 INPUT"Line",line%
   70 INPUT"Column",column%
   80 PROCprint( word$ ,shade, line%
,column%)
   90 UNTIL 0
  100 REM ==============
  110 DEF PROCprint( string$ ,colour
,x% ,y%)
  120 COLOUR colour
  130 CLS
  140 PRINT TAB(x%,y%) string$''
  150 ENDPROC
```

I think you should see what's going on here without too much trouble.

Suppose, for some strange reason, that we want to input our parameters in Mode 6, and then change to Mode 5 in PROCprint. You'll need to change line 20 to:

```
20 MODE 6
```

and line 130 to:

```
130 MODE 5
```

When you run it you'll get "Bad mode at line 130". This is because you aren't allowed to change mode within procedures.

You'll be amazed how often you'll forget this. But at least the error message points to the right line, even if it isn't a model of clarity.

Well that's enough for this month. By now I hope you've got a feel for procedures – and the sort of mistakes you can make.

- *Next month we'll use procedures in more sensible programs. Not only that, we'll see how using procedures can actually help you to design your own programs.*

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Maximum File Size (40 track) - 99k & (80 track) - 199k.
Maximum Record Size - 2k: Maximum Number of Fields - 200:
Maximum Field Length - 254 chrs.

Options Include:

1) WRITE - for adding records.
2) WORK - for displaying records, editing and deleting.
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4) SEARCH - multiple function search on up to 5 fields.
5) OPTIONS:
   a) sort records found in search on 3 fields in ascending/descending order (max records sorted is 500).
   b) work search list, with edit and delete.
   c) save records found in search to disc.
   d) load previously saved search list.
   e) make a search list.
6) PRINTER - copes with parallel and serial printers and allows you to set up the printout + all printer codes allowed + allows you to join fields together and allows you to set them into columns etc. A label print routine allows single or double labels to be printed.
7) REDEFINE - allows you to transfer all records from old file to new file plus add or amend field or record size. No more re-entering all your data if you wish to add a field.
8) TRANSFER - allows you to transfer selected records between files.
9) NEW - allows you to define new file.

+ real time clock + many more features.

If you want a professional database for the BBC micro the β-BASE is your only option.

Not compatible with Amcom DFS.

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BEEBSYNTH: disk £11.00 cassette £8.00

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JOYSTICK UTILITY: £6.00

Converts non joystick programs to work with joysticks. Works with any program using INKEY (-) in Basic or machine code, to detect movement, which applies to most programs. The routine is relocatable and sensitivity of the joystick can be varied. Compatible with most games, including Acornsoft. Very easy to use, just press the keys you want to transfer. The machine code can be saved as a block of just 100 bytes. Supplied on cassette but can be transferred to disk.

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SHADOW: £8.00

SHADOW is a tape cloning program that will enable you to make security copies of your own valuable cassette software. SHADOW works with 99% of all known programs including those with sections at 300 BAUD and those that load as files. SHADOW will handle programs with any number of sections and it will work with any of the current operating systems including 0.1, 1.0, & 1.2. SHADOW is the definitive tape backup system and as a bonus you also get 'INSPECTOR' on the same tape. This allows you to view all areas of memory, search and alter bytes, etc. Colour coding helps to simplify memory usage. All this for just £8.00, I don't know how we do it. 'It is a condition of sale that this program is not used for piracy".

GRAFKEY/GRAFDISK disk £12.95 cassette £9.00

The 'GRAF' series of programs are, to our knowledge, the cheapest entry to the CAD (Computer Aided Design) field on the BBC micro. Input is by either joystick or keyboard. All graphics modes can be used and altered whilst running, the functions provided are: Line, rectangle, triangle, circle, text (upper and lower case), paint and colour pallet (8 colours and flashing). Drawing aids include: Alignment grid, circle copy, delete, free memory, purge memory, variable cursor speed, clear screen and redraw. Save drawings to tape in about 20 seconds or to disk in about 2 seconds. Rubber Band is a very flexible line drawing facility and has to be seen to be believed. Pictures can be savedand included in your own programs, very easily. GRAFDISK also provides a screen save facility. Recommended by BBC MICRO USER, PCN, ELECTRONICS & COMPUTING, LASERBUG ect, used by universities, colleges and business, as well as the enthusiast.

SINGLE KEY: (requires 1.2 O.S.) £5.00

SINGLE KEY ENTRY provides the user with single key entry of all 66 keyworks on the BBC micro. Speeds up your program input, it's just like having 66 function keys and it only occupies 256 bytes. Compatible with BASIC 1 & BASIC 2.

EDUCATIONAL PROGRAMS

THE GARDEN: £8.00

A series of three programs to help children with colours, spelling and recognition. The three programs cover three overlapping age ranges from bright four year olds to eleven year olds. The first level concentrates on colours and requires a simple Y/N answer to a question. The other two levels are orientated towards spelling and sentence structure. A sentence is presented with a missing word and the child is required to choose the correct word from a list and then type it in. Using this method each exercise involves a sentence, three words and picture/word relationships, all of which help to expand the child's vocabulary and understanding. Excellent graphics are used to reinforce the teaching. All three programs are provided on each tape and are compatible with disks.

COUNTING: £6.00

Like 'THE GARDEN' this program uses good graphics to interest the child whilst engaged in learning. Various levels can be chosen with a maximum number of 20. Aural stimulation can be selected if required and allows the child to do the counting in various ways, it can even be done with eyes closed. The objects for counting are rockets that blast off, flowers which bloom, jack-in-the-boxes that jump etc, and are used to stimulate interest. Makes counting fun.

TAKE-1: £6.00

TAKE-1 is by John Sekula, the author of the acclaimed COUNTING program above. This new release concentrates on subtraction and again uses excellent graphics including sideways scrolling to gain the child's interest. Suitable for children counting up to 20 but the graphics are suitable for all. Recommended and praised by many teachers and parents. Give your children the start they deserve.

MATCHING: £7.00

A bumper tape of four programs covering numbers, words, shapes and patterns. Graphics have been deliberately minimised to avoid distraction from the subject. They are ideal for infants and pre-school children. 'NUMBERS' provides various levels and alternative methods for counting. The space bar can be used as a counting stick and a visual and aural reward is given. 'WORDMATCH' again has various levels and the child is required to match the subject word with its partner which is in the displayed list. There is a choice of moving the word or moving the marker. 'SHAPE MATCH' can be of use to all ages and has a wide difficulty span. The cursor keys are used to move the subject shape onto the correct match and they will then merge if the answer is correct. 'PATTERN MATCH' is similar to 'SHAPE MATCH' but colour patterns are the subject instead of the geometrical shapes. This program introduces shape, colour and relational concepts and can even be of help in detecting colour blindness, although any suspicions should be confirmed by an expert.

INTRO: £10.00

INTRO is a simple computer programming language which uses the immediate visual response of 'turtle graphics' to introduce a number of programming concepts and techniques and to illustrate a variety of mathematical ideas in the areas of measurement, pattern, angle, and the use of variables. INTRO is similar to LOGO but with some important and deliberate differences. The most obvious is the screen layout which sets a section of the screen aside as a scratch pad with room for instructions to be displayed. Another important difference is in the way procedures are defined, in LOGO you must decide before typing in the procedure but in INTRO the current program can be stored as a procedure by typing STORE NAME, or whatever. INTRO has a very full instruction set, permitting great flexibility in handling graphics and in addition allowing access to the BBC's mathematical functions, INKEY etc. Programs and procedures can be saved to tape just like normal programs. INTRO is supplied with a comprehensive nineteen page manual as well as demonstration programs on the tape. INTRO can be transferred to disk but files must still be loaded and saved on tape.

HUE-MEN £6.00

Designed and written especially for pre school children this program is loved and admired by everybody that sees it. It has proven a big hit with children and adults alike and no collection is complete without a copy of HUE-MEN. This program is the best example of animation in MODE 7 seen to date, yes MODE 7. We cannot praise this program too highly and it is actually educational too. The subject is colour and HUE-MEN succeeds in extending young children's attention span without the teaching element even being noticed. Recommended for children of all ages.

SHAPE-MEN: £6.00

SHAPE-MEN is by the same author as HUE-MEN, Phil Reynders, and uses similar concepts to aid in shape recognition. Again using MODE 7 and sound this program will extend the child's attention span considerably. A real must and both these programs are recommended by PRIMARY EDUCATIONAL SOFTWARE REVIEW.

ALL educational software is supplied on tape – but can be easily transferred to disk.

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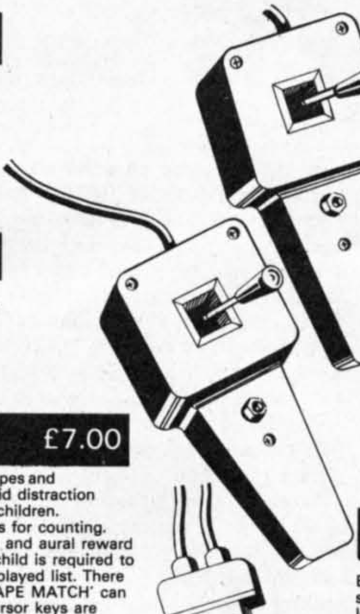

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The monitor can be used to display the current contents of registers, execute subroutines, single step through programs and so on, so speeding up the debugging process.

Before using the monitor for the first time you must first CHAIN the define program (Listing I). This sets up the table of values for symbolic listing (disassembly) and its own break routine.

When prompted by 'RECORD then RETURN', find a suitable area on tape and save the data file as created by this program.

If you are using cassette I suggest that you save a copy of this data *after* the monitor itself because the monitor will look for this table when you run it.

In other words, the tape you'll be using from now on will contain Listing II – I suggest you save it as 'MONITOR' – and the data file created by Listing I, in that order.

On discs it is much easier as you don't have to bother about the order.

To use the monitor you have thus formed, load the machine code program to be tested.

Now set appropriate values of PAGE, HIMEM and so on to allow Monitor (Listing II) to be loaded and run without destroying your machine code (for example PAGE=&4000) to force the monitor into the top half of a 32k machine. Now simply CHAIN the monitor.

The 6502 has one instruction – BRK – with a value of 0 which acts like an interrupt. In BBC Basic this is used as the method of reporting errors.

In Basic I there is a bug in error message reporting which can be bypassed by writing a small machine code routine and planting its address in the break vector.

A machine code program will now perform the Basic ON ERROR action whenever it comes to a BRK instruction.

In our scheme of things this enters Monitor, which manages the planting of BRKs, displays values and so on. Monitor must co-reside in RAM with the machine code program being tested, but uses only Basic system variables.

The Basic interpreter uses page 0 locations, and page &600 for temporary storage of strings.

Whenever a BRK occurs the values of all the 6502 registers are stored in A% and B%. The stored values can be seen and changed if required in Monitor, and are restored to the registers when the machine code is re-entered by Step, Trace or Run.

Step and Trace plant BRK instructions at the start of the instruction (or instructions in the case of a conditional branch instruction) which follow the current one.

Thus Monitor will be re-entered after each instruction is obeyed. Run plants BRK instructions at locations specified in a Breakpoint List, and Monitor will be re-entered when the next one is encountered.

It is the user's responsibility to check that the location is the start of an instruction, and that the program will actually get there.

Up to 10 breakpoints may be active at the same time.

Monitor does not prompt, but waits for you to enter a command. This is a letter, or Escape.

Any unassigned key will cause the current state of the registers to be displayed and a return to the waiting state.

After a command, if a value is required a prompt is given. All values are entered in hexadecimal. The Delete key acts as usual.

Commands which effect permanent changes – A,X,Y,F – can be aborted by pressing Escape. Terminate the value with Return.

The List, Memory display and Trace commands – L,M,T – generate multiple lines of output. They can be interrupted at any time by pressing any key. Monitor will then await another command.

There are four forms of output – Current Status, List, Display and Help.

Current Status shows the values of the Program Counter (PC), A, X, Y and Flag registers in hex, the status of individual Flag bits, and the mnemonic form of the instruction at PC, for example:

```
 PC   A X Y F   Flags  Instruction
8000  08001FF NV..DIZC JMP &801F
```

Bytes	*become*	*colour*	*print*
00-1F	**40-5F**	**Magenta**	**"**
21-7E		**White**	
80-9F	**40-5F**	**Red**	**&**
A0-FE	**21-7E**	**Yellow**	**$**
20		**White**	**0/**
A0		**Yellow**	**✓**
7F		**White**	**0s**
FF		**Yellow**	**,s**

Figure I: How the bytes are printed

List shows the value of the PC, the bytes forming the instruction in hex and characters, and the mnemonic form of the instruction:

```
 PC    Bytes    Chars    Instruction
8000 4C 1F 80   L"_&@    JMP &801F
```

Memory display shows the value of the PC, and the 8 bytes from that address in hex and characters:

```
8000 4C1F804CE9BC40 E  L"_&@ L$i$< @"N
```

In order to display all 256 byte values as characters some of them are transformed to printing characters. To show this they are displayed in colour.

For printer output, the colour codes are turned into printing characters, as shown in Figure I.

Space and &7F display as graphic square and graphic parallel lines respectively.

Help displays a summary of the commands available.

System variables

A%	Saves registers and flags AXYF.
B%	Saves PC and SP.
C%	Address of m/c routine to resume user program.
D%	Address of instruction types and mnemonics for Disassembler.
E%	Address of breakpoint table.
F%	Start) address of segment of breakpoint table.
G%	End) in current use.
H%	Single-shot/Trace/List marker.
I%	Various.
J%	Various.
K%	Various.
L%	First byte of current instruction.
M%	Address of BRK vectored m/c code.
O%	Prints marker (2– printer on, 3– printer off).
P%	PC.
Q%	SP (stack pointer).
S%	Address of current byte of instruction.
U%	Upper limit for Trace, Search (default value &8000).
V%	Value of operand and part of current instruction.
W%	Search pattern.
X%	Various.
Y%	Various.
Z%	Address of m/c search routine.

Commands

A,X,Y,F	Prompts for a 1 byte value and inserts it into the appropriate register. Displays current status.
P	Prompts for a 2 byte value and inserts it into the Program Counter (PC). Displays current status.
E	Resets the PC to its value at the current entry to Monitor.
G	Gets the address corresponding to the stack pointer and places it in the PC. Note that the user's machine code stack runs from an address one higher than this value to &1FF inclusive.
B,C	Set, clear breakpoint. Prompts for an address and inserts/deletes a breakpoint. Errors: **"Already in"** – There is already a breakpoint at that address. **"Not in breakpoint list"** – Attempting to delete a breakpoint which is not present. **"Breakpoint list full"** – Try deleting some unused ones.
D	Displays list of current breakpoint addresses.
L	Prompts for a count, and displays the store as instructions starting at PC for the specified number of instructions. PC is updated to the latest address. L can be interrupted by pressing any key.
M	As for L, but store is displayed in hex and characters.
W	Prompts for a 1 byte value, and Writes it to store at the current value of PC. Increments PC by one, and repeats. To stop, press Escape.
R	Runs the machine code from the current value of PC. Monitor will not be re-entered until a BRK is obeyed. A breakpoint on the first instruction to be obeyed will be ignored.
S	Obey one machine code instruction at PC, then returns to Monitor and displays current status.
T	Trace repeats S continuously until any key is pressed, or the next byte is not a valid 6502 instruction, or the upper limit address would be exceeded (see U). Note that an attempt to Trace into ROM will effectively revert to RUN, with no breakpoints set. Stop just before entering ROM routines and plant a breakpoint at the address where RAM code is resumed.
U	Prompts for an upper limit address. This is used in several ways. When an instruction is displayed other than for the List command if the address of its successor (or either possible successor in the case of a branch instruction) is greater than or equal to U, a flashing U is displayed. This will cause Trace to Stop. If the destination address in a JSR instruction is greater than or equal to U, the subroutine will be run at full speed, and Trace resumed at the instruction following the JSR – if the subroutine returns there.
H	Displays a summary of the commands.
Q,Esc	Resets the basic BRK action, and leave Monitor.
V	Prompts for a value and performs a VDU statement with that value. Monitor checks for and remembers VDU2 and VDU3.
Z	Prompts and displays the current search pattern of up to four bytes. This can be changed by deleting and re-typing if necessary. Note that leading zeros are ignored, for example Z?00010203 will search for the three byte pattern 010203. A minimum of one byte will be searched for. For example, Z?0 will search for a one byte pattern of 00. If the pattern is terminated by Return, the search starts at the current value of PC. If by Escape, at PC+1. The pattern is compared starting with successive bytes until the pattern is found, or PC=U. PC is updated. To continue the search, type Z and press Escape.

Full listing starts on Page 153

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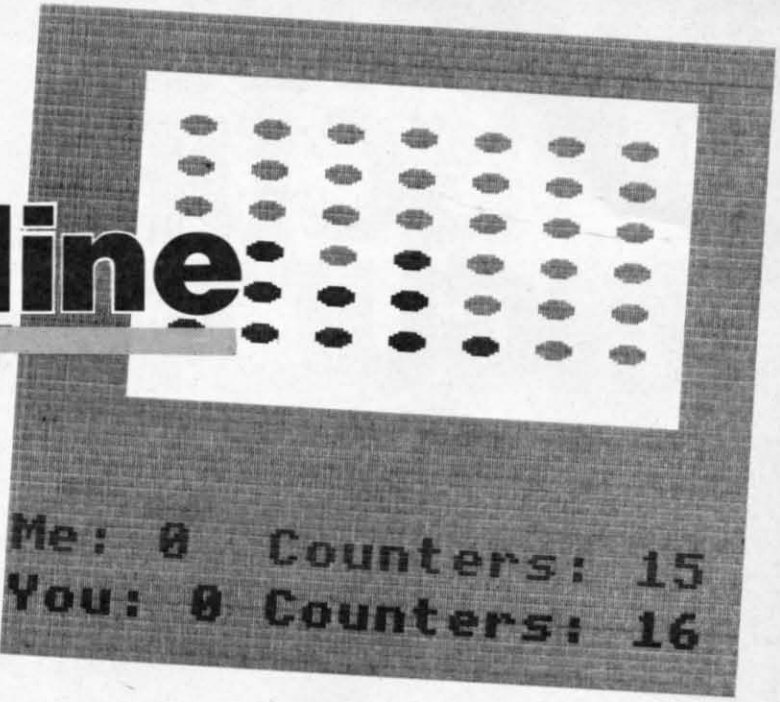

```
Me: 0  Counters: 15
You: 0 Counters: 16
```

Strategy's the name of the game as you try to out-think your Micro

By GORDON KAY

QUADLINE is a fascinating game of strategy where you try to out-think the micro. Compulsive in the extreme, it's guaranteed to keep the whole family wanting just one more go.

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→

PROCEDURES

PROCquery	Prints the instructions on the first call of each running of the program. This is achieved by calling itself twice and resetting the variable Z% each time. It then allows you to choose the colour you play, the level of play and who starts.
PROCbig	Prints a string in double height characters.
PROCprintboard	Prints the board and resets the variables to their start values.
PROCinkey	Inputs the player's move.
PROCcheckwin	Checks all possible lines of play.
PROCmygo	Makes the computer's move.
PROCvalid	Checks if a particular move would be beneficial.
PROCshowwinner	Emphasises the winning line.
PROCinit	Initialises the arrays and generates the user-defined characters and envelopes.
PROCprintcounter	Prints the decending counter.
PROCprintcountersleft	Prints the number of counters left for play.
PROCawinner	Decides who has won or if it is a draw and prints a suitable response.
PROCdelay	A simple delay procedure.
PROCshuffle	Randomises each scan of PROCcheckwin.

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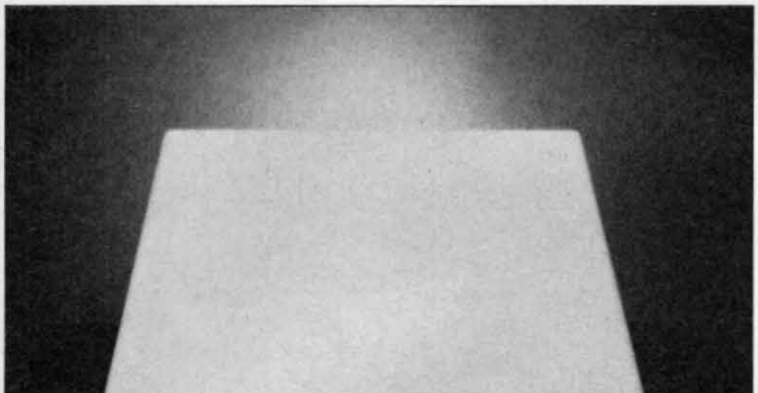

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From Page 53

spots what you've overlooked and you're defeated!

There are three skill levels. You can play the red or yellow pieces and either yourself or the computer can take the first move.

The main variables use long self explanatory names. For example, the winner flag is "someonewins". The exceptions to this are:

C%	General purpose parameter variable.
T%	General purpose counter.
X%,Y%	Counters for B%(7,6).
Z%	Recursive counter and intermediate counter.
CO%	Random number.
LX%,OX%	Cursor coordinates.
a%,b%,c%,d%	Local counters
q	Carrier variable for GET.
B%(7,6)	Main board array.
Y%(7)	Array for the number of counters in each column.
X1%(5),Y!%(5)	Used for line checking.
X2%(7),Y2%(6)	Used to vary the checking order each time round.
X%,Y%,A%	Also used as the transfer variables to CALL.

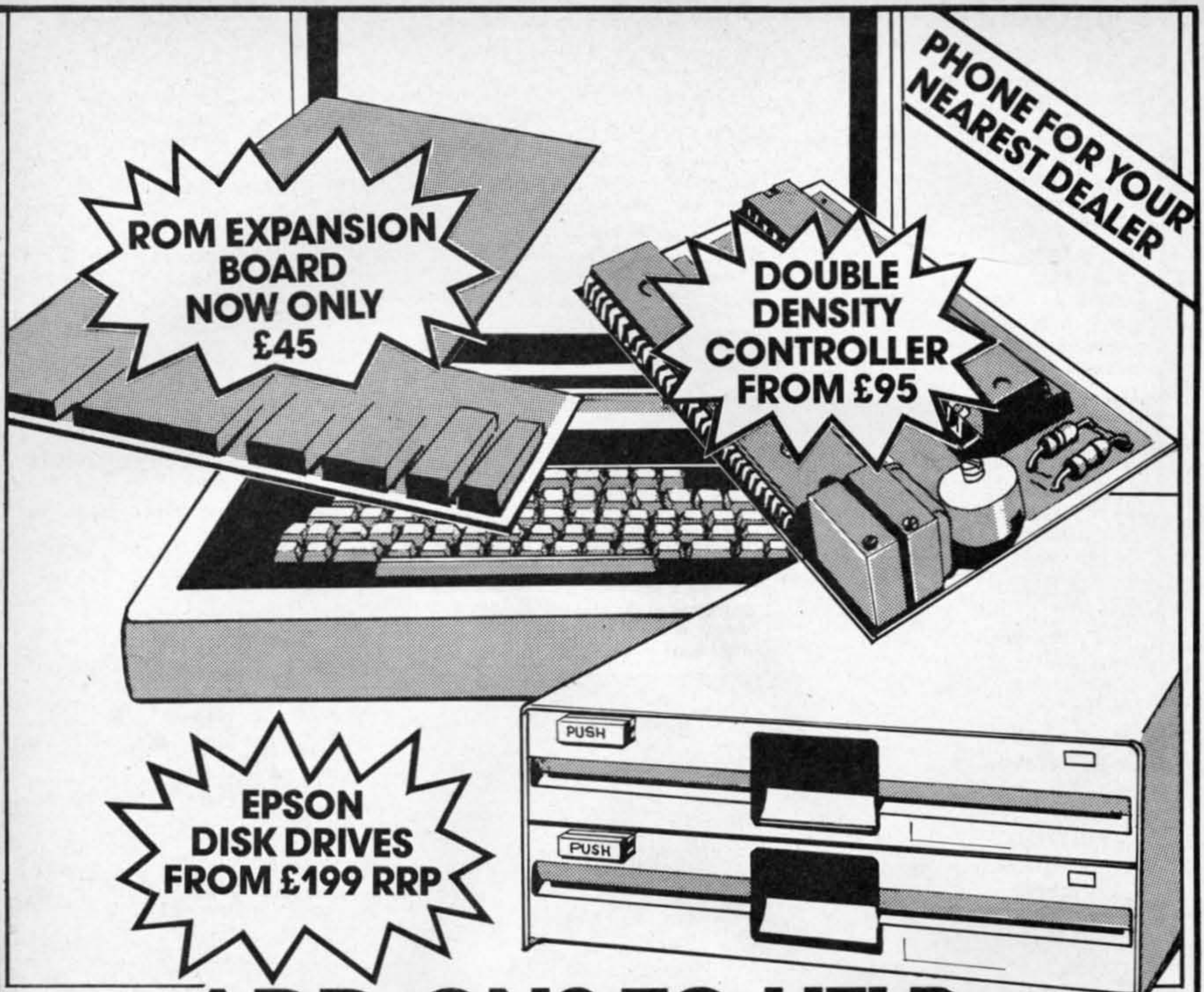
Quadline listing

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```
 10 REM *** QUADLINE ***
 20 REM *** (C) 1984 ***
 30 REM ***MICRO USER***
 40 *FX227,138
 50 *TV255
 60 ON ERROR MODE 7
    :REPORT
    :PRINT " in line No.";ERL
    :END
 70 *KEY0RUN|M
 80 *KEY10OLD|M|NL.|M
 90 MODE 2
100 PROCinit
110 REPEAT
120 VDU 23;10,32,0;0;0;
130 PROCquery
140 PROCprintboard
150 someonewins=FALSE
160 REPEAT
170 IF istart colour=2
    :PROCmygo
    :PROCprintcountersleft(2)
    :istart=FALSE
180 colour=3
190 PROCinkey
200 colour=2
210 PROCmygo
220 PROCprintcountersleft(2)
230 PROCcheckwin(4)
240 UNTIL someonewins OR counters<1
250 PROCawinner(someonewins,counters)
260 IF someonewins=2ORyou%=you%+1

    ELSE IF someonewins=4me%=me%+1
270 UNTIL 0
280 DEF PROCquery
290 LOCAL query
300 CLS
310 SOUND 1,1,200,15
320 IF Z%<2COLOUR 7
    ELSE COLOUR 6
330 VDU 19,2,1;0;19,3,3;0;19,9
    ,9;0;19,11,11;0;
340 PROCbig("*** QUAD  LINE ***"
    ,1,2)
350 PRINT TAB(2,6)"By Gordon J.
     Key"TAB(6,7)"(C) 1984"
360 IF Z%=0PROCbig("In order to
     win this",0,10)
    :PROCbig("game you have to"
    ,0,13)
    :PROCbig("get four counters"
    ,0,16)
    :PROCbig("in a horizontal,"
    ,0,19)
    :PROCbig("vertical or",0,22)
    :PROCbig("diagonal row.",0
    ,25)
    :PROCbig("Please press a key"
    ,0,30)
370 IF Z%=0
    :q=GET
    :Z%=Z%+1
    :PROCquery
    :ENDPROC
380 IF Z%=1
    :A$="Use the "+CHR$ 34+"<"+
    CHR$ 34+" and "+CHR$ 34+">"+
    CHR$ 34
390 IF Z%=1PROCbig(A$,0,10)
    :PROCbig("keys to position"
    ,0,13)
    :PROCbig("the cursor under"
    ,0,16)
    :PROCbig("the required row"
    ,0,19)
    :PROCbig("and press space to"
    ,0,22)
    :PROCbig("drop a counter."
    ,0,25)
    :PROCbig("Please press a key."
    ,0,30)
400 IF Z%=1
    :q=GET
    :Z%=Z%+1
    :PROCquery
    :A$=""
    :ENDPROC
410 PROCbig("Do you wish",4,9)
420 PROCbig("to play",6,12)
430 COLOUR 2
    :PROCbig("RED",8,15)
    :COLOUR 6
    :PRINT TAB(8,18)"or"
440 COLOUR 3
    :PROCbig("YELLOW  ?",5,21)
450 REPEAT
    :q=GET
    :UNTIL q=82OR q=114OR q=89
    OR q=121
460 SOUND 1,1,200,12
470 CLS
    :IF q=82OR q=114 VDU 19,2,3;0;19
    ,3,1;0;19,9,11;0;19,11,9;0;
480 COLOUR 6
490 PROCbig("What level do you"
    ,2,2)
    :PROCbig("require, 1 to 3"
    ,3,6)
500 REPEAT level=GET
    :UNTIL level>48AND level<52
510 SOUND 1,1,200,12
520 PROCbig("Do you want me to"
    ,1,10)
    :PROCbig("start?",7,14)
530 REPEAT q=GET
    :UNTIL q=89OR q=121OR q=78
    OR q=110
540 SOUND 1,1,200,12
550 IF q=89OR q=121 istart=TRUE
    ELSE istart=FALSE
560 ENDPROC
570 DEF PROCbig(A$,X%,Y%)
```

Turn to Page 136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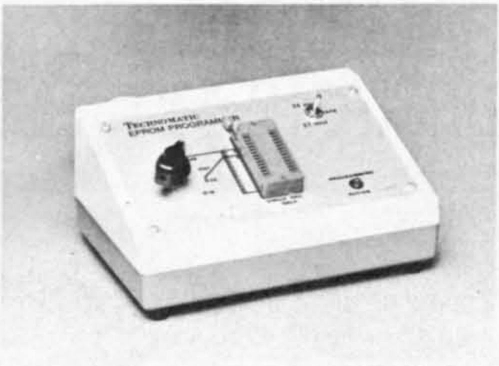

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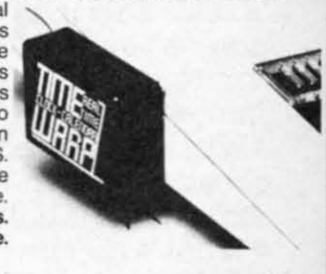

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***EXPAND** - Lists a program in an easy-to-read form, also allowing 'squashed' programs to be read.

***INSERT** - Enables BASIC routines on disc or tape to be inserted into or added to the program in memory.

***KEYLOAD** and ***KEYSAVE** - Load and save the function key definitions.

***LVAR** - Lists the values of all or some of the variables.

***MERGE** - Will merge one or more BASIC programs on file into the program in memory.

***MOVE** - Allows the current BASIC program to be moved to a new page in memory.

***PARTSAVE** - Saves only a selected section of a BASIC program (useful for later merging).

***RENUMBER** - Renumbers parts of BASIC programs and moves the renumbered section as necessary.

***RETRIEVE** - Restores a corrupted program to a form in which it can be listed and edited.

***SINGLEKEY** - Enables BASIC keywords to be entered quickly, as on the ELECTRON.

***SQUASH** - Reduces the size of a BASIC program in order to save memory space. A very efficient routine.

***STATUS** - Displays the values of PAGE, HIMEM, program length, bytes free, etc.

***TABSTOPS** - Provides a tabulation facility. Up to eight tapstops can be defined.

CARETAKER is supplied with a spiral bound manual, special 'single-key entry' stickers for the key fronts, and easy-to-follow fitting instructions. A full specification is available upon request.

```
CARETAKER 1.00
CURSOR (ON/OFF)
EXCHANGE <old> <new> G/S (<length>)
EXPAND (<start>) (<end>)
INSERT <fsp>(<line no>)
KEYLOAD (<fsp>)
KEYSAVE (<fsp>)
LVAR (F) (I) (S) (A) (P)
MOVE <address>
MERGE <fsp> (<fsp>) ..
NORMALKEY
NOTAB
PARTSAVE  <fsp> (<start>) (<end>)
RENUMBER ( <1st> <inc> <start> <end> )
RETRIEVE (<bytes>)
SINGLEKEY
SQUASH (S) (R) (M)
STATUS
TABSTOPS ( <columns ..>)
```

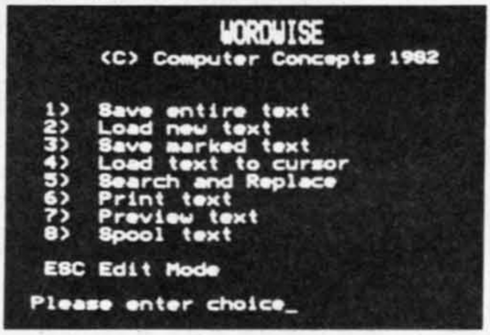
New Release

Wordwise

The Most Popular Word Processing ROM for the BBC Micro £46.00 incl.

WORDWISE is ideal as an introduction to word processing for the beginner, but is a powerful enough tool to be used seriously by professional authors (at least two of the most popular BBC Micro magazines are prepared entirely with WORDWISE). Being entirely ROM based it occupies none of the memory which is used to store text. It will operate fully on cassette, disc or ECONET (level II). It is not specific to any particular printer, nor does it require a special printer-driver (an expensive extra on some word processors). WORDWISE allows any codes to be sent to any printer, at any point within the text, by using a simple 'embedded command'.

For the beginner, text can be typed straight into WORDWISE and saved, loaded, previewed or printed immediately. Once experience is gained, commands may be added to control the final layout on paper. Some of the layout or 'formatting' commands are described later. At any time whilst the text is being entered or edited a word count is displayed continuously on the top line. Labelled function keys provide the user with simple controls to mark any section of text and then delete, move or copy it to any other position. Characters can be quickly converted between upper and lower case; changing case of entire paragraphs is equally simple.



```
            WORDWISE
    (C) Computer Concepts 1982

 1)  Save entire text
 2)  Load new text
 3)  Save marked text
 4)  Load text to cursor
 5)  Search and Replace
 6)  Print text
 7)  Preview text
 8)  Spool text

 ESC Edit Mode

Please enter choice_
```

Moving around the text is simple. Cursor keys alone move one position in any direction; CTRL and cursor keys together move in larger steps, a word left/right, a page up/down; SHIFT and cursor keys move as far as possible to the right/left of the line or to the start/end of the entire text. These movements are so easy to use that many other programs have adopted exactly the same method.

Formatting commands include the ability to split the document into pages of any length, with or without headings or footings. Page numbers may be printed automatically within the text, including within headings and footings. Commands are provided to set (at any point in the text) line length, left margin, tabulation positions, line spacing etc. Text can be centred on a line, indents and temporary indents can be set and cancelled. Output can be made to automatically pause at the end of a page, e.g. for a single-sheet feed. Right-justification of text can be turned on and off at any points in the text.

User-defined keys may hold any required string as normal and used within WORDWISE, including the codes required to induce key-operations such as cursor movement.

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Alice through the VDU

Our monthly foray into Adventure games

The Hobbit has a new collection of problems

AT last The Hobbit has arrived from Melbourne House for the BBC Micro. Read the book which is included plus the instructions and, unlike Bilbo, you are raring to go.

First time in don't bother with a map because you have to get a feel for the problems you will meet.

The first one is that Gandalf is as thick as a brick because he can't read the map. The second problem is that the only dwarf in the game is Thorin, who's as thick as two planks.

Then there's Oakenshield, who was always the most bloody minded of the mob. However he is cheaper to feed and, once you can arm him with a sword, he can be quite useful against Smaug.

Of all the creatures you can meet, the obvious target is Gollum in the Goblin's Cave. Unfortunately you won't be able to stumble around in the dark, like Bilbo, and just find the ring.

However if you don't get it then Smaug is going to prove rather more than a bare handful to kill.

On the first, quick pass I went through Rivendell, where Elrond proved, as expected, more literate than Gandalf.

I picked up the golden key in the mountains, reprovisioned at Beorn's, had a quick sniff at the Goblin Cave, was captured by an elf in Mirkwood and got killed trying to escape through the beer cellar.

Now for a listing and – real problems – the program fills the machine. I did start to get some Basic on the screen but when I tried connecting the line printer I couldn't repeat the trick.

Still, who needs it? After all the book tells you what you have to do and it's quite fun to try things that you know you shouldn't, like KILL THORIN or, at least, try to – he's as mean and bad tempered as ever.

I long ago gave up trying to draw a map while playing because you always wander off the edge or become confused by twisty mazes. The best way is to recreate the two-dimensional array the authors used.

The Hobbit has 10 directions – N, S, E and W (all of which you can input with the arrow keys), NE, SE, SW, NW, U and D. Lay out a ruled sheet of paper numbered down the left hand side like this:

No.	Location/objects	N	S	E	W	U	D	NE	SE	SW	NW	Comments
1	Hobbit hole/chest			2								
2	Outside			3	1							

In this way you can track and backtrack almost any trail and draw a neat map later on.

Another useful trick is to verify if an object exists somewhere. For example, try TAKE RING at the very start.

If the program replies I DON'T SEE IT HERE then you can be fairly sure there is a ring somewhere.

Next try TAKE XXXXXX and if the program responds I DON'T UNDERSTAND then you can be certain a ring exists.

However these are old tricks and the Hobbit presents some new, original features and problems.

In this game you must get the help of some characters to solve some of the problems and sometimes they can refuse to cooperate.

For example, you can SAY TO ELROND "READ MAP" and he might refuse, so just hit the @ key to repeat the command and Elrond et al should do what you want.

Gandalf is the most awkward because he does tend to wander off and Thorin, who tends to stick rather closer to you, won't carry him.

One of the game's attractions is that there is no unique solution because it changes every time you play it.

You first notice this when waiting to get the key off the rolls at the beginning and, later on, Elrond will read different hints from the map.

Also it is possible to get the congratulations message at the end of the game without scoring 100 per cent – rather similar to that last point in Colossal Cave.

The idea of characters with independence is also not entirely new. Recall the psychopathic, axe wielding dwarves in Colossal.

But it is now far more subtle because of INGLISH, which allows you to make quite complicated commands.

This is such an attractive development that the implementation is frequently disappointing. You are tempted to try things that are still beyond the program's capabilities – like TIE GANDALF TO TREE WITH

→

From Page 61

ROPE to stop him wandering off.

To process such complex commands requires a program on a par with Terry Winograd's Block World Ph.D. project which he did some 10 years ago.

In Winograd's "game" there are (simulated) a number of coloured blocks, cones and boxes.

You could give commands like PUT THE BLOCK UNDER THE GREEN CONE IN THE RED BOX.

The program would then check the syntax of the command, then the semantics and then the feasibility of the command.

It may look simple but it isn't because what do you do if there are two blocks under green cones and a green cone already in the box?

The Hobbit has similar problems in that it has to do a lexical scan (recognise the words in the command), then a syntax check (roughly which words are verbs, objects, etc), then a semantic check (roughly, are the objects mentioned available and are the verbs applicable?) and then a feasibility check (can you put an elephant into a box? – it all depends).

These problems were very much in the field of Artificial Intelligence 10 years ago and are still only resolved in very limited, special cases.

The unique feature of the Hobbit is that it is based on the 1937 book by J.R. Tolkien. In fact this is my biggest criticism, because it really isn't a very good book – the only interesting characters are Bilbo and Gollum and their meeting is the only memorable part of the story.

Obviously the game is aimed – and very successfully – at children. It has already sold about 100,000 copies. But note that the next product from Melbourne House will be a Sherlock Holmes puzzle where you, the great detective, with the aid of a bumbling Dr Watson, will have to convince Inspector Lestrade – who will be even dimmer than Gandalf – who the murderer is and then catch the villain.

This sounds a lot more interesting to the more mature among us. But the idea of basing an adventure on characters in books has only just begun to be exploited.

I would like to see a black magic adventure requiring rather more know-how than hammering stakes into vampires.

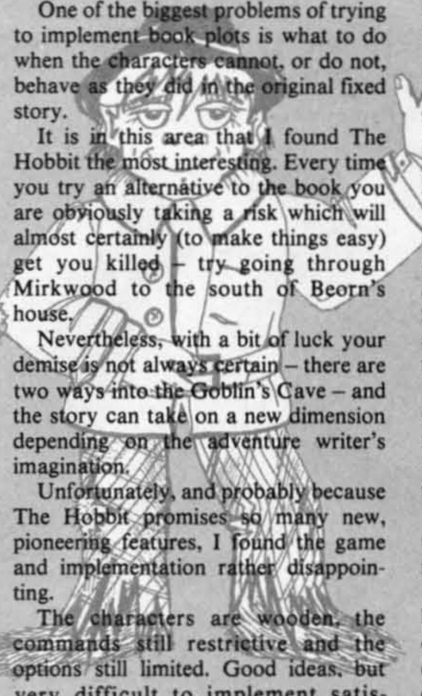
The best book in this genre is "The Devil Rides Out" by Dennis Wheatley, recently shown on television in a film version that missed out most of the interesting details.

The book is concerned with finding the Talisman of Set, an extremely potent object whose origin is not to be explained in front of the children.

The plot includes some very detailed journeys and a great deal of specific manipulation and incantation.

The hero would have to be the Duc de Richelieu but woe betide him – and you – if he doesn't know the last two lines of the Sussamma Ritual.

The appeal to me is that these lines are not given in the book because they can only be said when "the very soul is in peril".



One of the biggest problems of trying to implement book plots is what to do when the characters cannot, or do not, behave as they did in the original fixed story.

It is in this area that I found The Hobbit the most interesting. Every time you try an alternative to the book you are obviously taking a risk which will almost certainly (to make things easy) get you killed – try going through Mirkwood to the south of Beorn's house.

Nevertheless, with a bit of luck your demise is not always certain – there are two ways into the Goblin's Cave – and the story can take on a new dimension depending on the adventure writer's imagination.

Unfortunately, and probably because The Hobbit promises so many new, pioneering features, I found the game and implementation rather disappointing.

The characters are wooden, the commands still restrictive and the options still limited. Good ideas, but very difficult to implement satisfactorily.

One way of overcoming some of the problems is the MUD (Multi User Dungeons) concept which is only available, so far, in places which have a number of terminals linked to a large mainframe computer.

In this adventure system the people you meet are real but still as likely to mug and kill you.

An excellent account was published recently by Richard Bartle of Essex University. He describes a number of new features like extra rooms which can be added "on the run", so theoretically you can step from one adventure into another without realising it.

One of the interesting problems posed by this facility is the preservation of objects and characteristics you possess. At the moment all you can transfer is your knowledge of "magic" words.

This, although restricting, is totally impossible on micros until a master-slave operating system is available, but the concept should be a winner in micro computer clubs in a few years' time.

What you will be then able to do is really give vent to your murderous and/or amorous instincts. Computer dating should blossom as you, the frog, really do get to meet the sympathetic princess after the game.

The character that you develop in MUD is rather smililar to the D&D games – you can be weakened by hunger, fighting or have had too little sleep, but the longer you last then the more you know and the more powerful you become.

One of the ploys, according to Bartle, is to reach Wizard status and then pretend you are weak and ignorant.

When a novice attacks you, just blast him with a magic word. American hustlers will enjoy the practice.

Like Super User in UNIX – who can look at everyone's files, change them and even logout users – the Wizards can snoop on the other players, give them rubbish to carry, drop them into swamps and generally play havoc with the tinys.

It reminds me of the Magic Mode in Colossal Cave (not available in the micro version) when I could break their Ming vases, turn off the lamp and dump them in the Pirate's Maze.

After a hard day looking after the users it should be good therapy for responsible systems programmers.

Another possibility, which can now be exploited on a micro, is to build up a character through one adventure which can be saved, together with certain objects, strength, knowledge, etc, to attempt the next adventure in a series.

So far only the passwords – which are too easy to extract – have been used to go onto another adventure. But there are endless ways for the creators of these games to boldy entice you to buy the next episode.

Also this year you should be seeing the new generation of laser disc games where the (currently) crude graphics will be replaced by animated film clips.

However back to the present and The Hobbit. Full marks for ideas. It is full of Eastern promise and great for the kids, but if you are over 15 I suggest that you wait for Sherlock Holmes and mug up on Professor Moriarty.

Incidentally Holmes never did say, "Elementary, my dear Watson". But I'm sure the next program will understand.

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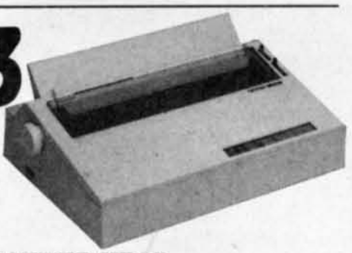

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Pass on messages via the micro's bulletin board

By PETER TOOTILL

THE BBC Micro is a very versatile beast. By virtue of its RS 423 port and Prestel-compatible graphics, it is well suited for use as an intelligent terminal to a variety of on-line systems.

All you need is a modem and some fairly simple software to connect your micro to a wealth of bulletin boards, databases and the various features of the Prestel system.

All these systems have their own characteristics, but I think one of the most interesting to use is the computer bulletin board system – often referred to as a BBS.

So what is such a system? The idea started in the USA, when a computer club decided that pinning messages for other members and notices onto a cork board on the wall was a bit too much behind the times for a high technology club like theirs.

They decided to hook a computer to a telephone and allow people with modems and micros, or even ordinary terminals, to dial in and leave their messages on the computer instead.

As modems were even then priced within the reach of the hobbyists in the USA, the idea was very successful.

It was soon taken up by other clubs and also by individuals, with the result that today there are at least 1,000 public and private BBSs operating in North America – and probably considerably more.

Since those early days the software that controls such systems has developed enormously and you can run a BBS on most of the popular micros available in the USA.

British BBS software is virtually non-existent as yet, but some programs are being developed.

Bulletin boards will allow callers to do a wide range of things, but the main emphasis is still on the traditional message and mailbox facilities.

For example, on most BBSs messages can be private or public, general interest or collected into special categories.

They will tell you if you have a message waiting when you call, and also let you search for messages on a particular subject.

Other features that you will find on a BBS include information and news files, help for inexperienced users, software to download, games and diversions, commercial sections and even advertising.

The reason I prefer using bulletin boards to Prestel or Micronet, which are the other systems readily available to the home micro user, is that they provide a very interactive type of environment, completely different in character to viewdata systems such as Prestel.

With a BBS you are always able to respond to the information on the system.

If you see something that interests you, you can leave a message about it, either to the originator of the item or to anyone else who calls the system.

In fact exchanging messages is really what BBS are all about.

There will always be a good bit of straightforward information on such systems, but it is usually there in a secondary role. For example there will probably be:

- Information about the system itself and how to use it.
- Information about particular subjects in the special interest sections.
- Files you can download into your own micro.
- Telephone numbers of other systems.

But unless the system has a particular theme of its own, you are unlikely to find much information of general interest on it.

If you are looking for train times, weather reports, financial information, hotel bookings and suchlike the large commercial systems such as Prestel are the place to go.

There is, of course, a certain amount of overlap between Prestel systems and BBS. You will find some news about the micro scene aimed at BBC users on Micronet and Viewfax 258 on the Prestel system, and also on some BBS.

But on the whole the Prestel systems are very much more one way. They do have response frames, or places where you can leave messages to the operators of the database concerned, but they don't normally have the public message areas that BBSs have.

The other advantage of BBS is that they are open to anyone with no subscriptions or membership, and are free of charge (except for the cost of the phone call).

On the other hand ordinary Prestel will cost you £5 a quarter (+VAT), and Micro Prestel (which has the software and some other features from the Micronet system on it these days) is a further £8 a quarter.

However most people can get Prestel with a local call, which is something that cannot be said for BBS. A long distance call can soon chalk up a couple of quid.

The BBC Micro user is fortunate in that he is not limited by his computer as to the systems he can use. Both BBS and Prestel are easily available, given the appropriate modem and software.

So if you are choosing a modem my advice would be – if you can possibly afford it – to look for a multi-mode type that will allow you to use both V.21 (300 bit/sec – most BBS) and V.23 (1200/75 bit/sec – Prestel) systems.

The same applies to software. Buy a terminal program that will enable you to use both systems, but remember that to use both you need the right modem AND the right software.

There's no such thing as software that will allow you to use a V.21 system via a V.23 modem, or vice versa.

Happy communicating!

Standard RS 232 settings for use with on line systems:

7 bit word (excluding parity bit)
Even parity
1 stop bit

Alternative settings that should work with most BBS:

8 bit word
No parity
1 stop bit

I recommend that you use the second setting, as most terminal software just ignores parity anyway, and it will normally work satisfactorily.

It also gives the added possibility of transferring binary data using standard CP/M protocols or XMODEM protocols which give error free file transfer – and which aren't just for CP/M systems.

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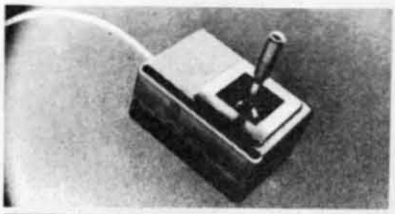

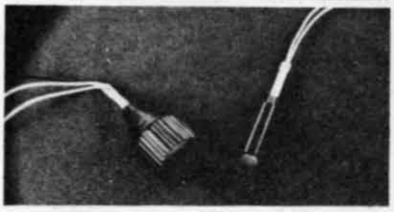

Let your micro do the talking

Put the zest back into your computing with this communications package, says JANE McDERMOT

DO you remember those incredibly exciting days when you first got your hands on a BBC Micro? The hours of fascinating discoveries, all night sessions, the slipping home early from work for a quick play ...

I can remember all too well those heady days. However recently the excitement seemed to have gone from my micro activities – until I discovered Commstar, the new communications ROM from Pace.

What Commstar does is to allow your micro to talk to other computers over the telephone system via a modem – more of which later.

It's a very versatile and complex piece of software, but getting started couldn't have been easier, as the manual is very clear.

I had the number of Microweb – *The Micro User's* bulletin board – and decided to contact that.

First of all I entered Commstar with *COMMSTAR, then chose "Chat mode" by pressing C when the options page came up.

The screen cleared leaving just a clock ticking away at the top right-hand corner. A nice touch that, obviously to keep the phone bills down.

All I had to do then was dial up Microweb and when I heard the whine of the answering carrier signal I simply connected my modem and away I went.

You see, Commstar is set up to talk to the many bulletin boards springing up around the world with the minimum of fuss. It has the correct speed of transmission – 300 baud – and has all the parity bits and whatnot set for it.

Once I'd got through to Microweb all I had to do was answer the questions it asked me and we were really chatting!

I could talk to the Sysop – he's the chap who runs the board – browse among the news and messages left by other callers, and even download programs.

As you'll find when you log on to a bulletin board, you have access to masses of information and it would be nice to be able to save it all to scan at leisure when the phone bill isn't ticking up!

Commstar allows you to do this, because it's got an in-built buffer where you can store all the messages you're receiving.

All you have to do is to type B. The incoming data, together with your responses, is stored in the buffer.

The buffer size varies because you can choose to display the screen in Mode 7, which gives you 40 columns and a buffer of over 20k, or Mode 3, which gives you 80 columns but only about 9k of memory.

Once you've got what you want in the buffer you can save it with the S command, examine it with V or print it out. In fact there's a print option (P) that will let you print out the whole of the goings on.

After I'd got used to talking to the Sysop, I decided to try downloading some messages – an option the bulletin board offered.

I'd forgotten to turn on my buffer, but fortunately Commstar turned it on for me and I was able to view it later with V.

It occurred to me that some downloaded files might be longer than the buffer, but a quick look at the manual soon cancelled those fears.

Apparently there's something called the XON/XOFF convention which, if the computer you're talking to is being sensible, stops things "overflowing". Commstar lets you turn this on if necessary.

If, like me, you're lucky enough to have a disc drive, you can bypass the buffer and store things directly on disc. So downloading is a doddle – just press D for discs.

In fact, you can store the whole proceedings on disc by choosing discs with D and opening the buffer with B.

So far I'd been working with the default characteristics of Commstar. However the manual showed me there was a whole range of other possibilities.

For instance you can vary the speed at which the data is sent – the baud rate – and you can also fiddle with the format of the data.

Apparently different computers require their data serving up in different ways – something to do with parity bits and stop bits.

Anyway, Commstar makes tailoring your BBC Micro to suit other computers child's play. Just press I and you're given a menu of options to choose from.

You can also specify the rate you want data transmitted and the rate you expect to receive it – they're sometimes different.

There's even an option so you can load from disc the requirements of the computer you want to talk to – apparently they're called protocols.

Anyway, by now I was feeling adventurous, and I'd discovered another Beeb owner called Robin who also had a Commstar, so we got together to transmit programs.

First of all, just to really test the system, we picked a non-standard set up from the table (option 6 – 8 bit word, even parity, one stop bit) and then we chose baud rates.

Now 1200 baud is a fairly fast way of transferring files, so I set my send rate to that. Robin, who was receiving the file, set his receive rate to that too.

Then all he had to do was open his buffer, press F, and tell his micro he was receiving. In the meantime I'd loaded the program I wanted to send into my buffer, pressed F and told Commstar I was sending. We both connected our modems.

Now pressing F causes the micro to receive and transmit any kind of data – Ascii, Basic or machine code files – in a way that's virtually guaranteed to survive the vagaries of the telephone system intact.

In no time at all Robin had my program and was up and running it. Then he sent one of his back to me. Again we used 1200 baud, so I set my receive rate and he set his send rate to 1200.

I used the disc option, so as I received his program – after pressing F and telling Commstar I was receiving – it was automatically spooled onto disc under the file name I'd been prompted for.

Now the modem I'd been using throughout my experiments was Grapevine, which is produced by the same people behind Commstar, so it's not surprising that the combination worked so well together.

The attractively designed modem has push buttons which let you set the baud rate for transmission. Now the options offered are 300 baud RX/TX (receiving/transmitting), and 1200/75 baud – either way round.

It was the 1200/75 option that Robin and I had used to transfer programs. When I was transmitting at 1200 he had to set his transmit rate at 75. Also I selected 1200TX/75RX on my Grapevine and he used 1200RX/75TX on his. When he sent stuff to me we reversed the settings.

We could have avoided all the fuss if we'd just stayed at 300 RX/TX, but 1200 is far faster and anyway it's a lot easier than it sounds.

In a perfect world we should have been able to transmit at 1200 RX/TX but Grapevine, in common with most other modems, doesn't have this facility – it's something to do with the "bandwidth" available over the telephone network.

The 1200/75 is a compromise – the one that Prestel has also chosen. And that brings us to another feature of Commstar.

All you have to do is to press the hash key and your micro is automatically set up as a Prestel terminal.

I have a friend who's a Micronet member – apparently that's part of Prestel – so I "borrowed" his account number and rang in.

I could easily become addicted to Prestel. With Commstar's aid I was able to explore it thoroughly. It's a real warren, full of all sorts of goodies.

I'm still exploring the possibilities of the Grapevine/Commstar combination – fortunately the manual is extremely clear and full of useful advice.

One future project involves the button on Grapevine that will allow me to use Bell frequencies, the sort they use in the States. Apparently there's a vast amount of activity over there that I intend to investigate.

I've already logged on to a bulletin board in Sweden and, if my bank account is up to it, I'm definitely going to become more international.

All in all Commstar plus Grapevine has really added a new dimension to my computing activities.

If you're looking for a new and exciting micro experience, my advice is to invest in this winning combination – you won't regret it.

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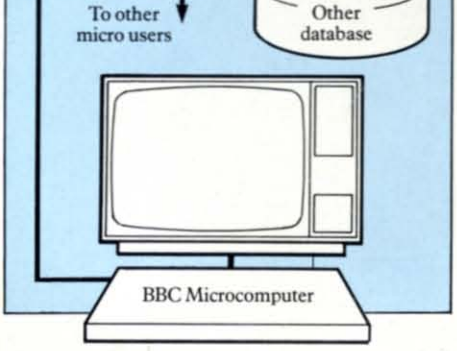

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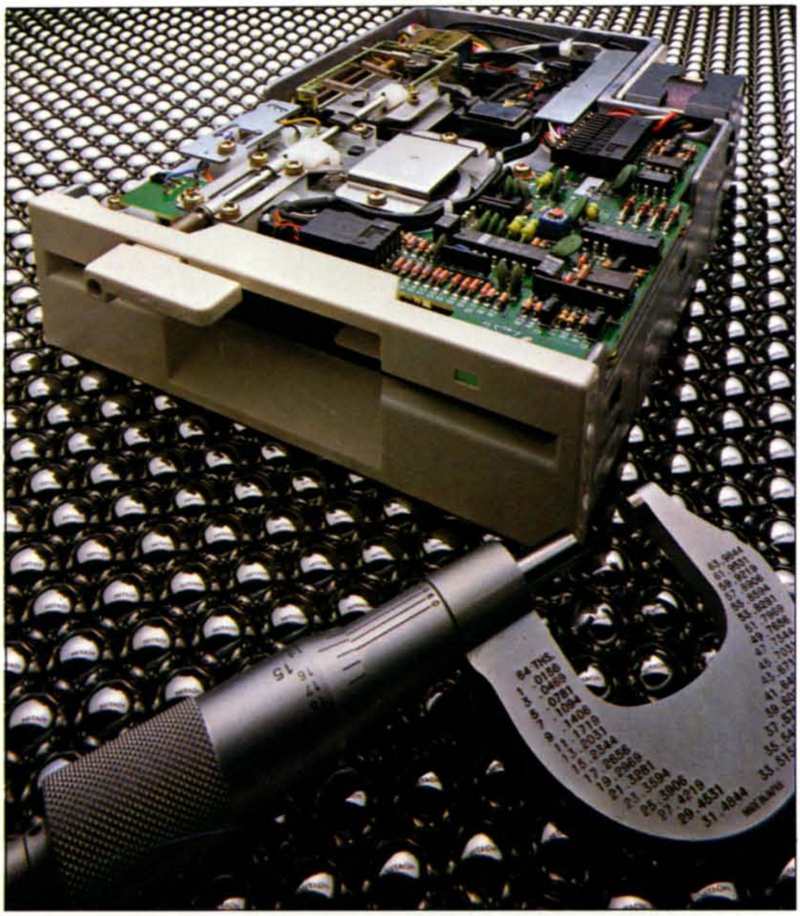

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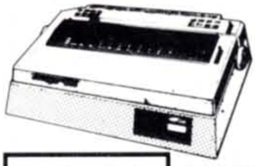

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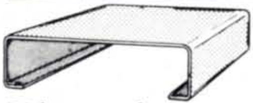

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Mind your own business records

Four software packages reviewed by KEN GARRETT

THE business programs reviewed this month are a selection from those available in the Gemini Combination Homepack and Businesspack. In addition we have included a look at Dbasebeeb from Carrera Computing.

Gemini
Manual and User Gu
Stock
Gemini
Manual and U
Mai
Gemini
Manual and User Guide for
Database
BBC Micro A or B 32K

THE aim of **Stock Control** from Gemini is, as one would expect, to help commercial users to record and control their stock.

The program is available on tape or disc. But it is not a true disc-based system in which a large file of data is kept on disc and records read from and updated to the disc as required.

The whole stock file has to be read into memory for processing and this puts severe restrictions on the number of records that can be held and the quantity of data that can be held in each record.

Gemini say that up to 50 stock records can be held on the 16k BBC Micro or 220 records on the 32k machine.

Of course more than one stock file could be created and brought into RAM as needed. But this solution would be tedious if discs were used and not at all practicable with tape.

For each item of stock the program records a reference (7), description (23), unit quantity (9), units in stock (5), cost price per unit, selling price per unit, minimum stock level (5), re-order quantity (5) and supplier name (23). The figures in brackets show the maximum characters in each field.

When using the program items of stock are referred to by their record number (1 upwards) which is allocated when the record is first put onto the file.

The above might seem to be a comprehensive list of the data a business would need to control its stock, but in practice it would normally be necessary to record additional information.

For example, many businesses record details of stock movements – dates and the quantities received and despatched.

To record such information would add enormously to the amount of data to be held in each record and would force a true disc-based system to be used.

However, even within the context of having the whole file in the memory, it is easy to think of useful – but compact – data that could be stored.

An option the program offers is to print out a list of all items where the quantity in stock is less than the minimum stock level specified.

This implies that we will soon run out of these items and that more – the re-order quantity – should be ordered.

However there is no field on the file where we can indicate that we have placed an order and are awaiting delivery.

When the understocked items are listed by the program we would have to go through the list, comparing it with a manually kept file of copy orders to make sure that we do not inadvertently place a duplicate order.

The program allows the basic functions of adding a new record, changing any field of a record, updating the balance of stock held for deliveries in and despatches out, and of deleting a record.

The last function also offers the facility of compacting the records.

If item 20 were deleted and the file compacted then all the records subsequent to 20 would be "shuffled down" by one record.

This is a facility that would need careful use, as renumbering stock records is likely to lead to considerable confusion.

To make use of data the records can be inspected on the screen and printouts obtained of all or parts of each record.

Also two more specialised screen reports are available – the understocked item – mentioned above – and what is termed a financial summary.

The latter gives totals of the cost value and the selling value of all items in stock and also displays the overall gross profit margin, defined as total sale cost divided by total sale value.

It should be pointed out that the two totals produced here will be of very limited use for any accounting purpose.

This is because each item of stock

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should be valued in the accounts at the lower of its cost and its net realisable value.

In simple terms this means that if an item is going to be sold for less than it was bought then that item should be valued at its selling value.

Therefore the stock valuation that may be required by accountants would be one in which some items will be included at their cost and others at their net realisable value. The program will not produce this calculation.

The financial summary also calculates what is termed as the "cost of new purchases". This is, for each item of stock where the quantity is below the re-order level, the total of re-order quantity multiplied by cost price.

Again this probably will not be of great practical use to a business as it is unlikely that all understocked items will be ordered precisely when reported in their re-order quantities.

Unfortunately the program gives no warning or special report when a quantity of stock held appears to be negative.

If this occurs it suggests that there has been a bookkeeping error. I think that this should be reported to the user for investigation.

The program is menu-driven and all screen formats are well-designed and make good use of colour. However in my opinion the program offers only rudimentary help in stocktaking and something better ought to be possible in what is billed as business software.

★

THE **Mailist** system was designed with the primary aim of producing address labels on a printer. It can also be used as a simple name and address file on which various sorts and searches can be made.

The program is available on disc and tape but, again, is not a true disc-based system, as the entire datafile has to be in memory.

Several files could be used, and according to Gemini the system allows a maximum of 220 records to be on each file on the 32k machine (50 records on the 16k).

Each record has fields for name, title, two general address lines – each field with room for up to 22 characters – town, county – up to 18 characters each – post code and telephone number.

There is also room for a what is called a searchkey, which will be discussed later.

All the basic functions of adding, amending and deleting records are available, together with the ability to browse through the file.

There is also the facility to sort the file on any one of the fields such as into alphabetical order of name, and it is perhaps here that we begin to feel the limitations of the system.

When we say alphabetical name order we would normally use the surname to define this. However mailing lists would almost certainly include initials or forenames and we might also want to include the form of address to be used (Mr, Dr, Ms and so on).

As there is only one field available for all of the name data and as the sort treats the leftmost characters as the most significant, the results of a sort will probably not be as required, all Drs being listed before all Misses and so on.

Curiously, a sort seems to be undone if a record is deleted without the file having been saved in its re-sorted form and then read back.

A search facility allows the user to select records which have certain values in any given field. For example, we could look for all addresses in which the town was London.

It is possible to search on any one field or on the searchkey or on both.

The searchkey is an additional field which can hold up to 10 characters and each character position can code for a given quality.

The first position could be used to describe a person's credit rating (for example, 1-6), the second position could describe the type of business (such as A-K) and so on.

A search can make use of any number of the character positions in the searchkey.

Once again the system could be limited in some areas, particularly when using the name field, as it looks for a match in the leftmost character positions.

So if we wanted to select the record of Mr Brown, who was stored on the file with an unknown initial, we could not use the search facility to do this.

Two types of printout are offered – a full address label (multiple copies if wanted) or a telephone list. In both either the whole file can be printed or only those records which have been found in a search.

The program is easy to use and has attractive use of colour. Bearing in mind the limitations mentioned, the program can handle simple mail list applications competently. See, however, my comments at the end of the review of Gemini's Database program.

★

THE program **Database** allows a file of data to be set up, manipulated in a variety of ways and saved for future use.

The user begins by deciding on the record layout. This is done by defining the number of fields there are to be in each record and, for each field, its length and whether it is to hold alphabetical data.

A field is a distinct piece of data such as a name or a price. Gemini says the only restriction on record layout is that there can be no more than 12 fields for each record.

When a file's format has been set it cannot be altered other than by going back and starting again.

Once the record layout has been defined the user can add, delete or amend the records and can display on the screen or print whole records or any one field of the records.

There is no facility to format the output of records on screen or printer, the fields appearing as a list in their input order.

The file can be sorted on any single field into ascending or descending order and there is also the facility to search for records which have fields conforming to user-defined limits.

The search can be performed using up to eight selection criteria. For example, if on the name field the limits are A and C and on an age field the limits are 20 and 30 then the search will give all those records in which the person has a name beginning with A, B

→

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From Page 73

or C and who is aged between 20 and 30.

In other words, the search gives the records which are the intersection of the selection criteria.

Another facility offered by the program is that of performing two types of calculation on any one numeric field.

In the first type a field can be totalled and its sum and average displayed. In the second, a field can be used as a variable in a Basic calculation and the answer stored in another, or the same, numeric field.

This type of calculation can be applied to any range of records on the file.

To be used by the program a file of data has to be copied into memory and this will limit the size of file that can be dealt with.

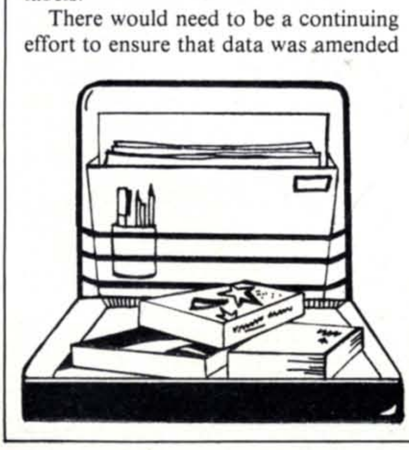
As a rough guide there is room for about 120 records on a file consisting of records containing about 50 characters each.

To sum up, this is an easy to use but rather unsophisticated database program. I think it a pity that Gemini could not have offered a system which integrates the facilities available in Mailist with those available on Database, as so many of the processes are similar.

For if a user wants to hold a lot of detailed data on a customer the Database program would probably have to be used, despite the searchkey on Mailist.

This data would almost certainly include names and addresses, but as there is no way in which these fields could be used by Database to produce address labels it would have to be duplicated on the Mailist file to produce labels.

There would need to be a continuing effort to ensure that data was amended consistently on both of the files.



Many users, I feel, would find such duplication of effort unacceptable.

* * *

A SPLENDID database program which incorporates a range of facilities similar programs will find hard to match is **Dbasebeeb,** by Carrera Computing.

The screen presentation is good and the program makes very full use of colour.

It has the basic functions of adding, amending, deleting and saving records and also a generous supply of more specialist options which I will describe in turn:

- **Add an extra field.** If the format of the records proves inadequate and extra information has to be held, then this facility allows extra fields to be easily incorporated into the records without having to start a file from scratch.
- **Define screen format.** The layout of the fields as they appear on the screen can be freely altered and re-altered. When a file is saved details of the format currently being used are preserved so that when that file is loaded again the records are displayed as before.
- **Printing the file.** All or some of the records on the file can be printed out, records being chosen individually by record number or according to search criteria. (See the Find function below.)

The user can also define which fields of the records are to be printed and the format in which they are to appear on the printed output. They could, for example, be printed out in address label format.

- **Calculations** can be performed on numeric fields and the user can choose between either obtaining the total of a numeric field or performing other calculations.

Up to five field references can be made in a calculation and this will allow quite complex calculations to be performed, the answers being stored in a specified numeric field.

- **Find records.** Up to eight selection criteria can be applied to the records. Each criterion consists of a minimum and a maximum field value or a search can be performed for the occurrence of a specified string anywhere in the field. This option can be used in conjunction with the print facility described above.
- **Sorting.** The program asks the user to indicate which field is to be used for the sort and whether the sort is to be in ascending or descending order.

Each sort is performed on one field at a time, but if the file is to be sorted on the basis of more than one field, performing the sort in reverse order of significance will result in the required file order.

If a name and address file is to be sorted in ascending name order within town order (that is the alphabetically arranged population of Abington appearing before the population of Bath and so on) sorting on name then on town will produce the correct order.

- **Multiple entries.** This allows identical data to be placed in chosen fields of all or a number of records.

One drawback is that such a comprehensive program occupies quite a lot of memory, limiting the space available for the data. Approximately 100 records, each of about 55 characters, can be held in any file.

These figures are based on the whole of the program being resident in memory and could be improved if the program could be broken into segments, bringing into memory only the piece needed at the time. This is precisely what is offered on the second side of the tape.

The program is divided into five sections. The main control section is always resident in memory and the four others are overlayed into memory as required.

This increases the capacity of files which can be handled to approximately 155 records of 55 characters.

To use the segmented program as described really requires a disc drive so that the loading of sections is reasonably fast.

However if a user finds that only certain sections of the program are ever required, instructions are provided on how to construct a tailored program.

This would then be used as a single, unsegmented program and would work well on tape.

This is an excellent database program offering a very wide range of facilities. I look forward to further offerings from Carrera Computing.

Computer Concepts

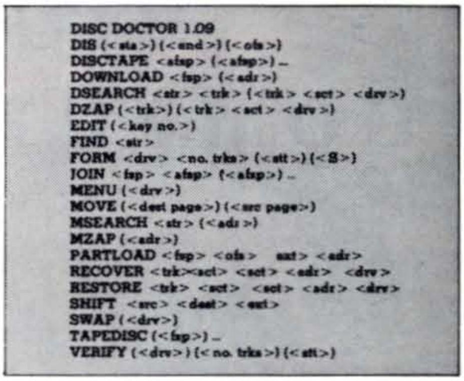
ROM SOFTWARE

for the BBC Micro

Disc Doctor

DISC DOCTOR is a general purpose utility ROM which adds 20 new commands to the BBC Micro. Most of these are concerned with disc operation although some of the commands are general purpose.

The extensive range of disc commands include a disc search routine and a very easy to use sector editor which allows any sector to be examined and changed if necessary. The built-in formatting command has a special option allowing dual catalogues on each side of the disc, so that up to 60 files per side may be used - almost twice the normal limit.



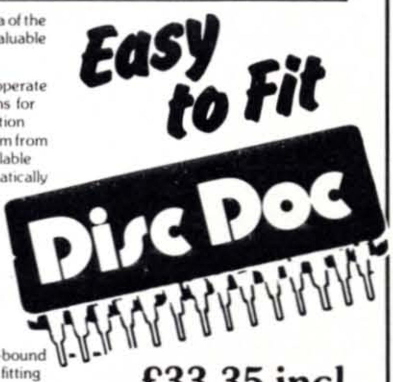
```
DISC DOCTOR 1.09
DIS (<sta>)(<end>)(<ofs>)
DISCTAPE <afsp> (<afsp>) _
DOWNLOAD <fsp> (<adr>)
DSEARCH <str> <trk> (<trk> <sct> <drv>)
DZAP (<trk>)(<trk> <sct> <drv>)
EDIT (<key no.>)
FIND <str>
FORM <drv> <no. trks> (<stt>)(<S>)
JOIN <fsp> <afsp> (<afsp>) _
MENU (<drv>)
MOVE (<dest page>)(<src page>)
MSEARCH <str> (<adr>)
MZAP (<adr>)
PARTLOAD <fsp> <ofs>   ext> <adr>
RECOVER <trk><sct> <sct> <adr>  <drv>
RESTORE <trk> <sct>  <sct> <adr> <drv>
SHIFT  <src> <dest> <ext>
SWAP (<drv>)
TAPEDISC (<fsp>) _
VERIFY (<drv>)(<no. trks>)(<stt>)
```

*RECOVER and *RESTORE commands are provided to help in the restoration of deleted or partially corrupted files. Any area of the disc may be transferred to memory, altered and *SAVEd or *RESTOREd back onto the disc. These commands prove invaluable when hours or even days of work are accidentally lost.

Many disc users often encounter the frustration of programs originally designed for use on cassette and require relocating to operate on disc. Disc Doctor provides commands to help with the transfer. *TAPEDISC and *DISCTAPE provide a simple means for automatically transferring non-protected files between tape and disc. Once programs are on disc, there are several relocation functions available. *MOVE will move a program from one page in memory to any other. *DOWNLOAD will load the program from disc and automatically move it to a specified position. *MENU is more comprehensive still, offering a menu of programs available and allowing single key-press selection of any one. The chosen program is then loaded, re-located if necessary and automatically executed, whether BASIC or machine code.

General purpose commands include: *DIS - which will disassemble an area of memory, following or skipping jumps, adding an offset, disassembling an instruction at a time or disassembling continuously.
*MSEARCH - to quickly locate any string of bytes in memory, specified either as a character string, numeric values of a mixture of both.
*MZAP - a very easy to use memory editor, allowing the user to scroll quickly up/down memory. It can be called from other programs to examine memory, then return to the program.
*EDIT - will list any or all of the function key definitions, so that the user may edit and copy them.

The DISC DOCTOR ROM contains a full help menu listing all the commands and their syntax for quick reference. A spiral-bound manual gives general information about discs and describes each of the commands in detail, with examples. Easy-to-follow fitting instructions are supplied, allowing the ROM to be easily fitted by even the inexperienced user.



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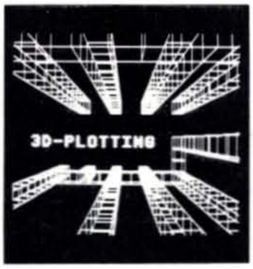
Graphics
ROM

The GRAPHICS EXTENSION ROM brings 30 new powerful graphics commands to the BBC machine. The commands may be typed immediately or included within programs written in BASIC, BCPL, FORTH, etc. The commands act quickly (being machine code) and are always available without taking large amounts of program memory. The commands can be split into three catagories:

1. Sprite Graphics

A sprite is similar to a user-defined character, except that sprites may be multi-coloured, several times larger (8x8 to 24x24 pixels in size), they are easily defined and altered with in-built commands and may be saved and later loaded. Sprites may be displayed and quickly moved around. Up to 32 different sprites may exist at the same time. 'Films' may also be created, in which any sprite is treated as a single 'frame'. Each time the 'film' is used the next 'frame' in sequence is automatically displayed, allowing simple animation of sprites. Any number of the possible 32 sprite numbers can be defined instead as a 'film' which may include a list of up to 47 'frames' in any order.



2. LOGO 'Turtle' Graphics

By using simple FORWARD, BACKWARD, LEFT and RIGHT commands a 'turtle' can be moved very quickly around the screen, producing intricate patterns by the most user-friendly means. The commands may be included in structured BBC BASIC programs providing a system faster and more powerful than many of the packages currently used to demonstrate LOGO turtle graphics.

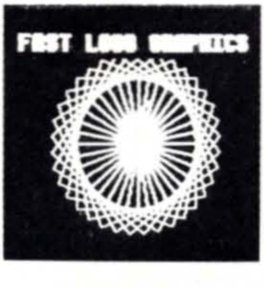
Computer
Concepts

3. General purpose commands

- FILL will fill an intricate shape.
- CIRCLE provides fast and easy circle drawing.
- ARC fast easy arc drawing.
- PLOT provides 3D graphics drawing by plotting with X, Y, and Z co-ordinates.
- SCALE allows a scaling factor to be applied to everything subsequently plotted.
- ROTATE applies a rotation upon all subsequent standard PLOT, DRAW and MOVE commands so that they are rotated around any origin.

A built-in help menu showing the syntax of all commands is provided for quick reference. Included in the package is a comprehensive spiral-bound manual and step-by-step fitting instructions, suitable even for the inexperienced.

Further details available upon request.



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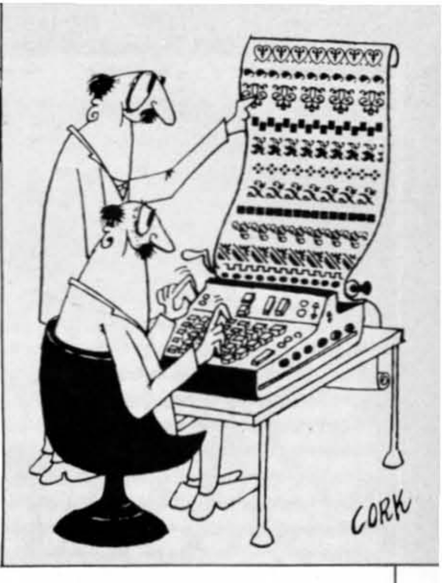
TORCH
COMPUTERS

PROGRAMMERS' WORKSHOP

Find the right PAGE but don't lose your place



By ERIC H. CRISP

IF YOU have ever tried to hold two Basic programs in memory at the same time you may well have encountered problems when it came to running them.

The User Guide indicates on Page 317 that this is possible by using the pseudo-variable PAGE, but warns "use with care" without saying how.

So how can it be done?

First, let us look at this pseudo-variable PAGE. Normally, PAGE = &E00. If you have extra ROMs fitted, such as a DFS, you may find that PRINT PAGE gives some other value such as &1900.

PAGE always has a value that is a multiple of &100 (256 in decimal). Try making PAGE some other value and it is made equal to the nearest multiple of &100 below. For instance, try:

```
PAGE = &2399
PRINT ~PAGE
```

You should find that PAGE has the value &2300.

PAGE is the pointer that indicates where in memory the Basic program starts.

Two programs can be stored in memory at once by starting them at different PAGE values. You then choose the program you want by setting PAGE to the relevant value.

Try this:

```
PAGE = &2000
NEW
10 REM PROGRAM I
20 A$ = "PROGRAM I"
30 PRINT A$
40 END
PAGE = &2400
NEW
10 REM PROGRAM II
20 A$ = "PROGRAM II"
30 PRINT B$
40 END
```

Notice that NEW was entered before typing in the program. This is necessary to reset the internal pointers to the new value of PAGE.

If NEW is omitted a "bad program" error or even a system crash is probable.

If you now make PAGE = &2000 and type OLD and LIST, you get Program I. Make PAGE = &2400 and type OLD and LIST and you get Program II.

Note that OLD is typed in to recover a program at a particular PAGE value. This ensures that the internal pointers match the program at this PAGE value.

If there is no program, or the program at this PAGE value has been corrupted, a "bad program" error results.

Two of the main pointers OLD sets are TOP and LOMEM. TOP is a function that indicates the top of the Basic program.

LOMEM is a pseudo-variable that indicates the start of the space allocated for variables and is normally set to TOP.

The other main pointer not mentioned so far is the pseudo-variable HIMEM. This is normally set to the start of screen memory.

The space for variables is restricted to between LOMEM and HIMEM.

Now back to Programs I and II. To aid swopping from one program to the other, set up the red function keys as follows:

```
*KEY1 PAGE = &2000 ¦M OLD ¦M LIST ¦M
*KEY2 PAGE = &2400 ¦M OLD ¦M LIST ¦M
```

Just press function key f1 to see Program I and f2 to see Program II.

To see if the programs will run, press f1 and type RUN to run Program I and press f2 and RUN to run Program II. You should find that it works.

Now add a new line to Programs I and II. Press f1 to get Program I and type in:

```
35 DIM A(1000)
```

Press f2 to get Program II and type in:

```
35 DIM B(1000)
```

It may be an idea at this stage to save Programs I and II in case of accidents by pressing f1 and typing:

```
SAVE "PROG1"
```

and pressing f2 and typing:

```
SAVE "PROG2".
```

Now run Program I in the same way as before. It should still be all right. Press f2 and you should find that Program II has been corrupted, resulting in a "bad program" error.

If you saved the program as suggested earlier, do the following to load it back into the correct place:

```
PAGE = &2400
LOAD "PROG2"
```

Pressing f1 and f2 should show that both programs are there again.

If you run Program II first this time you should find that Program I is still safe. But as soon as you run Program I, Program II is corrupted.

The reason for Program I corrupting Program II is that Program I uses the memory starting at LOMEM to store its variables.

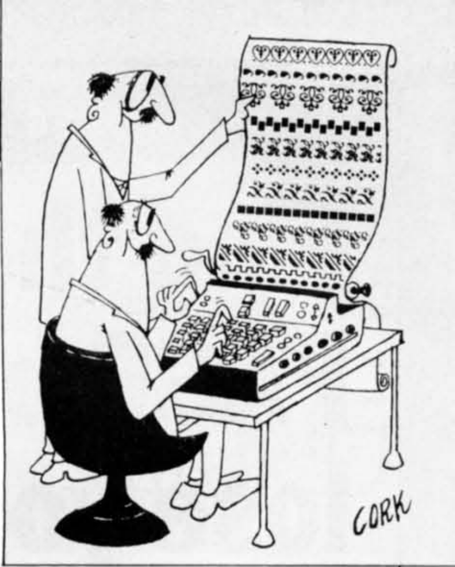
Program I has a lot of variables, because of line 35. So although Program I's LOMEM (&2044) is some way below Program II's start, the variables overlap into Program II's space.

Without line 35 this overlapping of space does not occur because of the much reduced memory need for the variables.

This problem is solved by restricting

→

PROGRAMMERS' WORKSHOP



From Page 77

the area variables can use above Program I by keeping LOMEM at the value of TOP for Program II.

However OLD changes LOMEM to the value of TOP for the present program, and so does RUN.

So LOMEM will need resetting immediately after doing OLD and the program run by doing GOTO 10 instead of RUN.

Thus, KEY1 described earlier would now be:

```
*KEY1 PAGE=&2000¦M OLD¦M LOMEM=&2446
¦M LIST ¦M
```

where &2446 is the value of TOP for Program II.

Now try running Program I with a GOTO 10 (after pressing f1) and see if Program II is still intact.

You should find that corruption no longer occurs because the variable space is kept above Program II.

Now that LOMEM is kept at the same value for both programs, each program uses the identical space for variables so that those set up in one program can be used in another.

The trouble is that OLD effectively loses all but the resident integer variables as does RUN and setting LOMEM.

The way round this is not to use OLD at all and use a GOTO after changing PAGE.

There is a slight problem with this method. Since OLD has not been used after changing page, TOP will still have its old value.

Unfortunately you cannot change TOP as you can PAGE and LOMEM. Try it and you should get a "Syntax error"' because it is a function and not a variable.

However, TOP can be set by typing LIST after changing PAGE.

To see this, get Program I by pressing f1. Then:

```
PRINT ~TOP
```

to see its value (&2044). Then type:

```
PAGE = &2400
```

to get Program II and:

```
PRINT ~TOP
```

to see that its value is still &2044. Now type:

```
LIST
PRINT ~TOP
```

and you should find that TOP is now correct for Program II (&2446). Creating an error instead of LIST by pressing Escape, for example, will also set TOP.

So change function key 2 as follows:

```
*KEY2 PAGE = &2400 ¦M LIST ¦M GOTO
10¦M
```

and also insert line 32 as follows:

```
32 PRINT A$
```

This now changes LOMEM to &244F so function key 1 needs changing so that it has LOMEM = &244F in it.

HANDLE WITH CARE
PAGE

If you run Program II at this stage with RUN you will get a "No such variable at line 32" error since it has not been defined yet.

However if you press f1 and type:

```
GOTO 10
```

to run Program I then press f2, to run Program II, no error occurs and line 32 prints A$ since A$ was defined by Program I.

Unfortunately you cannot LIST from within a program to set TOP. The only way to get TOP right from within a program is to directly change TOP in zero page where it is stored in &12 and &13.

TOP should now be &244F for Program II. So doing:

```
?&12=&4F:?&13=&24
```

will set TOP to &244F.

The processor always stores its numbers back to front which is why memory location &12 contains the least significant half of the value.

So Program I can be changed to go straight into Program II while keeping all variables. The changes to Program I are:

```
15 LOMEM = &244F
40 PAGE = &2400
50 ?&12 = &4F : ?&13 = &24
60 GOTO 10
```

If you now press f1 to get Program I and run it using GOTO 10, it should automatically run Program I and Program II.

If you are not convinced by the result on the screen, then insert line 32 into Program I:

```
32 A$ = "FROM PROGRAM 1"
```

A few final points to note. The area of memory reserved for your variables is between LOMEM and HIMEM. This space will vary if you change mode, as this will change HIMEM.

If the space needed for the screen is already occupied by variables, a "Bad mode" error results.

If there is not enough room between LOMEM and HIMEM for the variables then a "No room" error results.

Also, if you store any of your programs above the lowest value of HIMEM that occurs, you will be in danger of losing these programs when you change mode.

Finally this technique can enable many programs to be in memory at once providing:

- LOMEM is always set at the start to the value of TOP for the program highest in memory, and is then left at that value.
- TOP is set by LIST or POKEing zero page after each changing of PAGE.
- The programs are run by using a GOTO.

Both programs and variables should then be preserved.

Next month these ideas will be expanded to include procedures and GOSUBs and the problems of changing mode in them.

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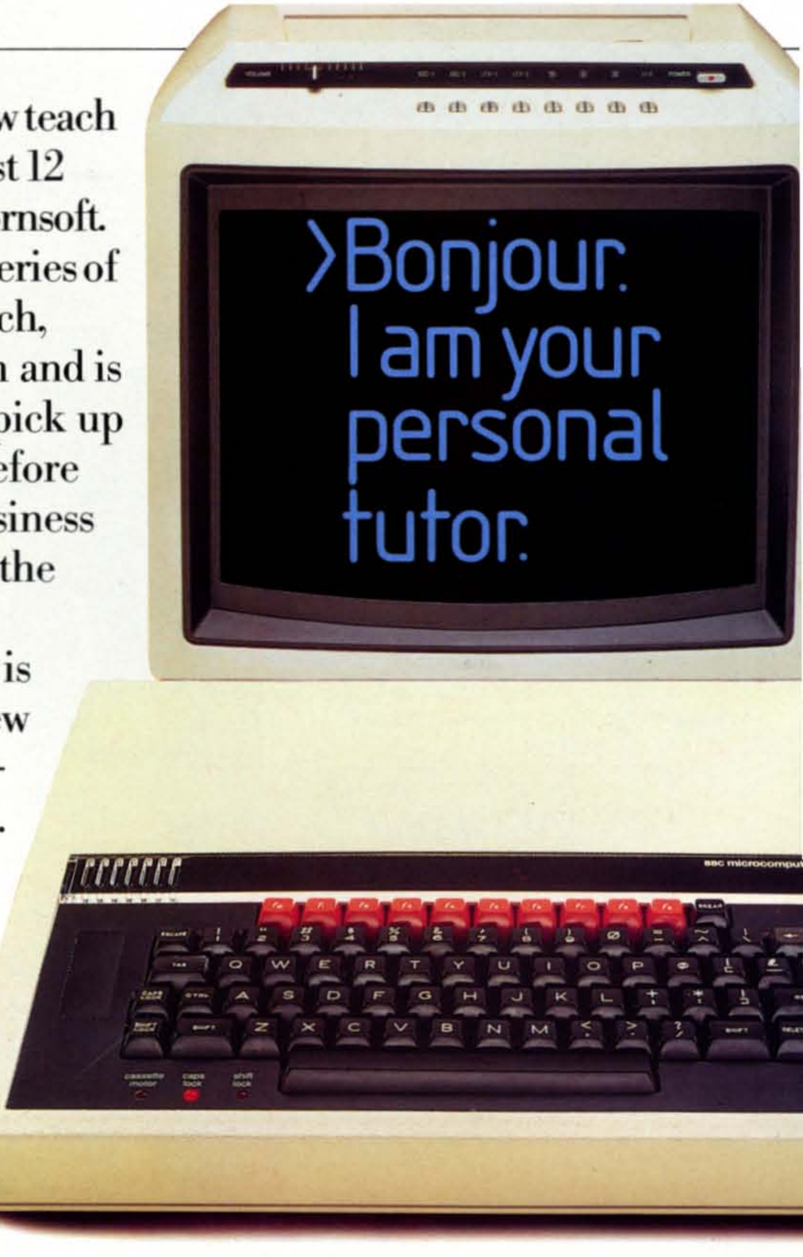

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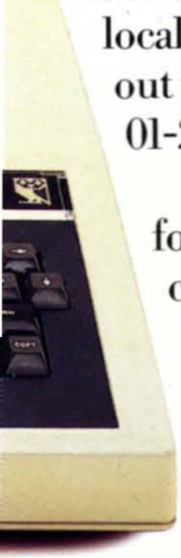

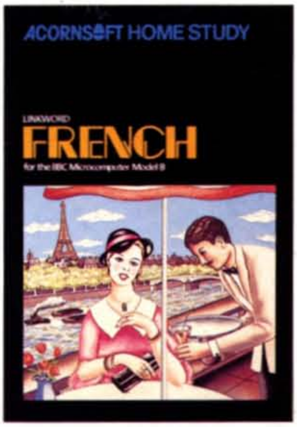
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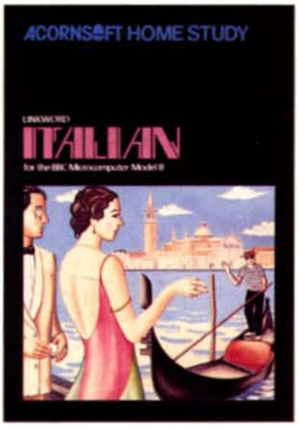
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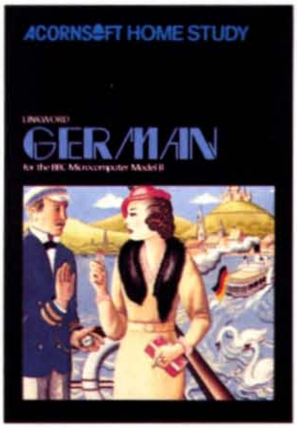
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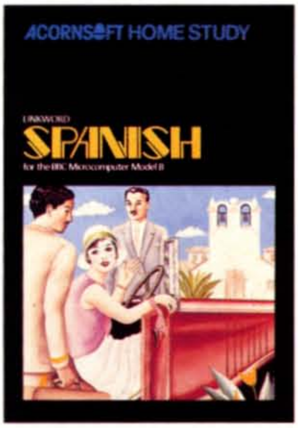
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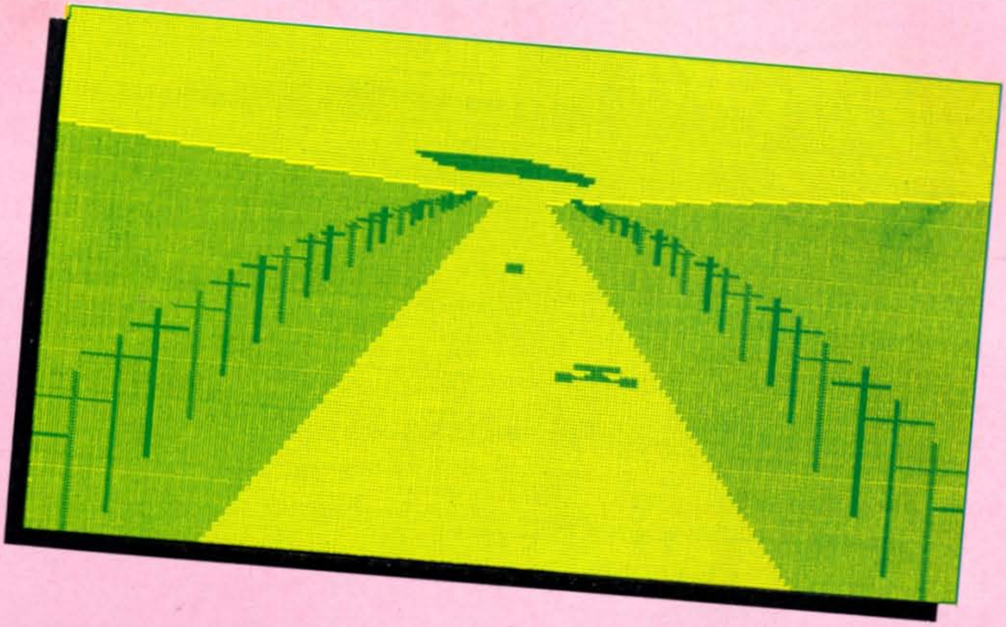
< = left
M = start
> = right
Space = freeze

	Procedures
PROCgame	Starts game
PROCsetup	Sets up data and car positions
PROCsetup1	Resets variables after a crash
PROCroad	Sets up mountains, etc.
PROCroad1	Clears road after crash
PROCtele_pole	Sets up telegraph poles
PROCdrawl	Draws telegraph poles
PROCmove	Changes player's car position corresponding to input
PROCmovecar	Draws player's car
PROCcar	Chooses randomly, computer's cars
PROCcar1, PROCcar2, PROCcar3	Draw computer's car corresponding to the choice of PROCcar
PROCcrash	Draws a crash
PROCend	The end of the game. Enter name etc.
PROCdelay	Gives a short delay
PROCscore	Prints the score on top of the screen
PROCinstructions	Gives instructions for the game

	Variables
GO	Number of lives left
GY	Changes the stop and start of the car
CHC	Chooses computer's car (used in PROCcar)
MCP%	Moves player's car position
MC1%,MC2%,MC3%	Moves computer's cars
CX1%,CX2%,CX3%	Computer's X coordinates
CY1%,CY2%,CY3%	Computer's Y coordinates
CN1$,CN2$,CN3$	Computer's different cars depending on X and Y positions
count	Used in crash routine
CO1:CO2	Changes colour for background scene
score	Player's score
scene%,TI	Changes background scene
CC$,PC$,SC$	Sets CN1$ etc... in PROCsetup



Road Racer listing

The listings in this article are produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of *The Micro User*.

```
 10 REM ****** ROADRACER ******
 20 REM ****** BY D M SHEPHERD
    ******
 30 REM ****** (C) MICRO USER 1984
    **
 31 H%=300
 35 CLEAR
 40 MODE 1
    :PROCinstruction
 50 MODE 2
 60 ON ERROR VDU 4
    :MODE 1
    :REPORT
    :PRINT ERL
    :END
 70 REM RACE
 80 CLS
 90 PROCsetup
    :PROCsetup1
100 PROCgame
110 DEF PROCgame
    :CLS
120 TIME =0
130 PROCroad
140 PROCtele_pole
150 REPEAT
160 FOR scene%=1 TO 4
170 PROCmove
180 NEXT
190 UNTIL FALSE
200 ENDPROC
210 DEF PROCsetup
220 ENVELOPE 1,6,2,20,16,16,0,0
    ,126,0,0,-126,40,40
230 VDU 23;8202;0;0;0
    :CLS
240 DIM CY1%(21),CY2%(21),CY3%(21)
    ,CX1%(21),CX2%(21),CX3%(21)
    ,CN1$(21),CN2$(21),CN3$(21)
250 FOR VU=224 TO 233
    :READ A,B,C,D,E,F,G,H
    :VDU 23,VU,A,B,C,D,E,F,G,H
    :NEXT VU
260 CC$=CHR$ 225+CHR$ 224+CHR$ 226
270 PC$=CHR$ 228+CHR$ 229+CHR$ 230
280 SC$=CHR$ 233+CHR$ 231+CHR$ 232
290 NAME$="COMPUTER"
    :Hi=H%
300 RN1=1
    :RN2=1
    :RN3=2
310 REM ***SET UP CAR POSITIONS***
320 FOR I=1TO 6STEP RN1
    :READ CY1%(I)
    :NEXT
    :FOR I=1TO 6STEP RN1
    :READ CX1%(I)
    :NEXT
330 FOR I=1 TO 6 STEP RN2
    :READ CY2%(I)
    :NEXT
    :FOR I=1 TO 6 STEP RN2
    :READ CX2%(I)
    :NEXT
340 FOR I=1TO 11STEP RN3
    :READ CY3%(I)
    :NEXT
    :FOR I=1TO 11STEP RN3
    :READ CX3%(I)
    :NEXT
350 CN1$(1)=CHR$ (232)
    :CN1$(2)=CHR$ (232)
    :CN1$(3)=CHR$ (232)
    :CN1$(4)=CHR$ (227)
    :CN1$(5)=SC$
    :CN1$(6)=CC$
360 CN2$(1)=CHR$ (232)
    :CN2$(2)=CHR$ (232)
    :CN2$(3)=CHR$ (232)
    :CN2$(4)=CHR$ (227)
    :CN2$(5)=SC$
    :CN2$(6)=CC$
370 CN3$(1)=CHR$ (232)
    :CN3$(3)=CHR$ (232)
    :CN3$(5)=CHR$ (232)
    :CN3$(7)=CHR$ (227)
    :CN3$(9)=SC$
    :CN3$(11)=CC$
380 GY=0
    :GO=1
```

Turn to Page 131

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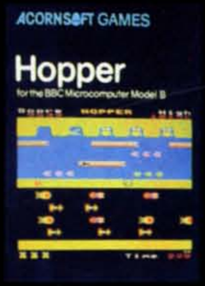

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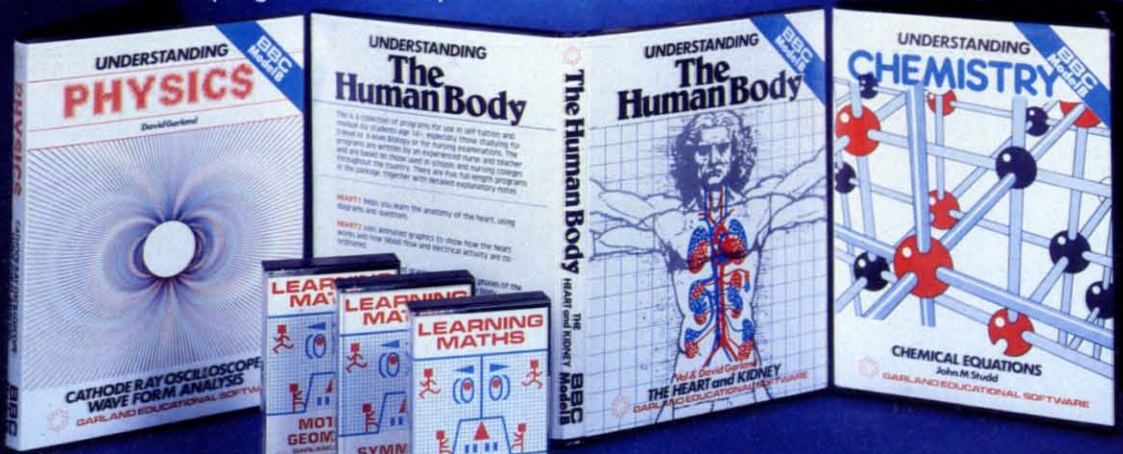

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Garland Computing 35 Dean Hill, Plymouth PL9 9AF. Tel: (0752) 41287

Fortress – the hottest thing since Killer Gorilla!

I MUST admit that when the editor summoned me to his office today to see "this exciting new arcade game" I was rather worried I'd have to review just another boring version of Space Invaders, dressed up to suit the '80s.

I couldn't have been more mistaken – I was presented with a copy of the hottest thing out of a software house since Killer Gorilla!

I felt like John Wayne ready for the final shoot out. Would it beat me? The hell it would . . .

At first sight, **Fortress** by Amcom would seem to be another space game. But as just a few minutes of play will reveal, it's something quite different.

You are given command of a delta winged starfighter. Your task is to destroy the enemy headquarters and escape.

And that's no mean feat, as it's guarded by rocket launchers, gun turrets, enemy planes, force fields and so on.

Despite the opposition, it can be done, and the surprise at the end is both original and entertaining. *(If I told you what it was then it wouldn't be a surprise, would it?)*

However, what really puts Fortress in a class of its own is its unique 3D diagonal scrolling. It literally does make the game a new dimension in arcade games for the BBC Micro.

Accompanied by ear-crunching sound effects, the action is fast and furious enough to present a challenge to even the most hardened of video gamesters.

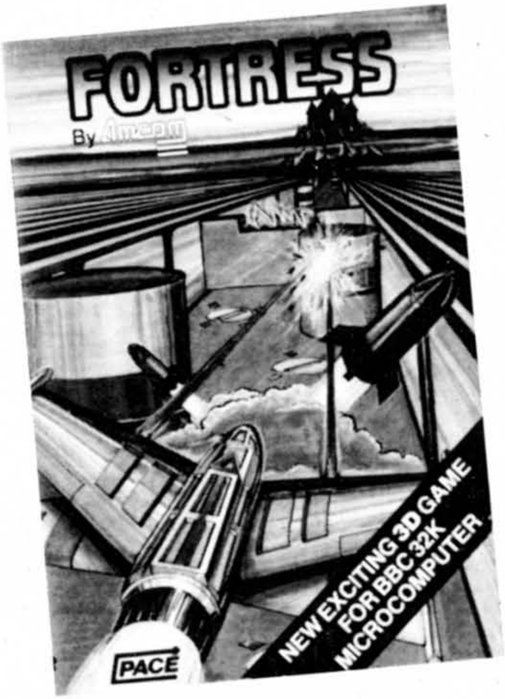
Control is either by keyboard or joystick, and the key set may be redefined if you so desire.

My only criticism of the game is that it tends to be a little predictable. This doesn't mean it's easy – just that it's easy to predict you're not going to last too long in your first couple of goes!

To sum up, the game is thrilling, the diagonally scrolling graphics superb and the sound effects excellent.

In fact it's so good, the editor had to unplug my Beeb to get me to write the review. Highly recommended.

Mark Lewis


FORTRESS
By Amcom
NEW EXCITING 3D GAME FOR BBC 32K MICROCOMPUTER
PACE

Clue up on coordinates

IN my youth I spent many an hour with pencil and squared paper playing battleships – trying to find where my brother had deployed his fleet and to sink them before he destroyed mine.

Chalksoft's **Man** is a variation on that theme, in which an invisible man is hidden somewhere in a grid.

You do not need squared paper and you don't need a brother!

As in the game of battleships, the object is to find the man as quickly as possible.

If your guess is incorrect you are given a hint such as NW or S.

To increase the challenge you have only a limited amount of time to locate the man.

Failure to find him is rewarded by: "Do you want another game?"

Success results in the sort of noise you associate with failure.

The program makes good use of colour and graphics, though a grid of either lines or dots would have been helpful.

The program gets all the input and does not wait for Return to be pressed.

The Delete key does not erase the last character input but all of the current input string.

The hints which flash in a text window at the bottom of the screen tend to disappear just as I look down.

When tested in the classroom this program did help pupils to understand coordinates and I would recommend it, though it seems rather expensive.

John Lord

Sortie with sharks

THE title, **Lemming Syndrome,** conjured up all sorts of ideas and fantasies, and I was not disappointed by Dynabyte Software's interpretation.

Mad Marco, the potty programmer (does this remind you of anyone?) has blown up the bridge to the mainland and is on the rampage.

The only escape for the fleeing people of the island is to jump like lemmings into the shark-infested waters. Which is where you come in.

As Lifeboat Lennie – well you have to be known as something – your job is to bounce the people to safety across the water on your liferaft.

You must be careful not to fall into the jaws of the awaiting sharks and you must avoid Mad Marko's attempts to blow up the raft.

The setting is visually very attractive with vivid use of colour and sound. I especially

→

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liked the shrieks from the doomed people, falling prey to the sharks and the water.

The instructions are clear and concise with many options, but the game is nevertheless fairly limited.

When 50 of the population are killed you just start your mission again.

There are five variations of speed, and an option for changing the level of difficulty. However I found the latter to be no more than an option aligned to the speed.

Feeling a little cheated, I also found that, for me at least, increased speed just made the game impossible.

I am, however, quite willing to concede that this was a failing on mine and not the game's part!

You can also choose between absolute and proportional control for your raft, and this definitely enhances the game.

Proportional control enables you to move left and right, whereas absolute control moves you to three predestined positions – to the left, middle and right of the ocean.

The latter of these two methods is the easier for rescuing people and thus provides its own variations on degree of difficulty.

This game is certainly no show-stopper. But despite its limitations I found it to have the same sort of hypnotic appeal as one of those pocket computer games that you claim to tire of very easily but can't seem to put down.

Isobel Suart

Action on angles

ANGLE, from Chalksoft, is a package of four programs which go together in pairs – a demonstration program and a program where the new knowledge is put into practice.

The first demonstration program measures angles as fractions of a turn, relates these fractions to degrees and then estimates angles in terms of degrees.

The second demonstration program shows how to use an angle indicator (a protractor to measure 360 degrees).

Angles are drawn and the angle indicator superimposed.

The angle is then read off the scale. Both programs are clear and helpful, the second particularly so.

Each contain sufficient examples to put the points across clearly.

The interactive programs use the knowledge learned from the previous program and there were no ambiguous questions.

Unfortunately there is no help if the wrong answer is given.

This package is most useful in the classroom. The development of the content is well thought out and works well in practice.

The use of graphics is excellent throughout.

John Lord

Music hath charms

LIKE the author of this program, I am also a former teacher of the piano and have experienced the frustrations of repeating the whereabouts of middle C and so on to sticky-fingered little children.

However in **Reading Music Made Easy** by Childsplay it is claimed that the learner can literally teach himself, or at least with the minimum of supervision.

Having waded through numerous manuals and programs which, while they display the micro's extensive musical capabilities, do very little to threaten the jobs of music teachers, I was sceptical.

To my delight, however, I found that such hefty claims were more than met by this quite excellent program.

The basic test involved is to recognise and name a succession of notes displayed on staves drawn on the screen.

Because of the range of well thought out options, even such a basically simple program caters for a wide range of needs and capabilities.

I especially liked the way all necessary instruction is displayed on screen in an easily assimilated manner.

You are initially asked what facilities and information are required. The screen is then set up accordingly and prompts are given asking you to demonstrate if the information has been absorbed.

As a beginner you may only wish to start by learning the notes of one clef, with no leger lines. While the text is in progress you are constantly reminded of the names of the notes, for which there are the usual rhymes to aid memory.

As you become more proficient, you may feel you can do without such reminders or wish to add the leger lines.

You may even feel up to mastering another clef before continuing with the test.

Whatever your chosen level of

QUICK RUNS

A first look at some of the latest releases

Digger: *Rid your garden of Footas and Pubars in this underground chase. They cannot pass through earth as you tunnel, unless they change into ghosts. Beware the fire-breathing Pubars. Pump them up until they explode, or for more points, tunnel under rocks to crush them.* (Visions)

★ ★ ★

Rocky: *Drop rocks on the patrolling mutant robots. They emit a yellow light from their single eye which will weaken you if it strikes. If you are not carrying a rock when caught, the mutant changes into either a spectre or a crusher to make life more difficult.* (Superior)

★ ★ ★

Overdrive: *A multi-stage 3D road race through night, snow, desert, and riverside scenes. To qualify for the next scene you must overtake enough cars to finish in the top 12.* (Superior)

★ ★ ★

Battletank: *In this 3D game you guide your tank between pyramids, sighting the enemy tanks from your turret. Their relative position is displayed on the long range scanner as you attempt to bring them within range of your gun.* (Superior)

★ ★ ★

Boris In The Underworld: *Guide Boris through the underworld caverns in search of his stolen valuables. Fight off the underworld creatures as the walls close in on you.* (Superior)

★ ★ ★

Cosmic Kidnap: *Move and shoot your laser base in an attempt to prevent the alien swarm from rescuing their colleagues. Shoot them as they attempt to break into your solid jail brick by brick, but beware the evil bug as you manoeuvre under a hail of bombs.* (Superior)

★ ★ ★

Pool: *A simulation using six balls plus a black and a cue ball. Control the direction of the cue and the strength of the shot. The computer does the rest.* (Dynabyte)

★ ★ ★

Percy Penguin: *Trapped in an ice maze, you must survive the deadly Snobees as* difficulty, having achieved the target recommended by the computer you are then set a higher, yet perfectly obtainable target, and are given an analysis of your previous performance.

You may be thinking that while this sounds great for the beginner it is not much use to the more advanced musician.

A nice feature of the program, however, is the constant time display which will measure the speed of your progress.

Thus even after a flawless performance of the most difficult form of the test you are still informed you can improve by becoming faster.

The program may not be quite as valuable to the musically-initiated, but it will certainly aid in the speed and accuracy of sight-reading, and test the reaction time of even the most advanced musician.

There is always the incentive of trying to beat the "impossible" task of successively completing the given test within 12 seconds.

There is also the opportunity for developing pitch.

The program caters for a wide range of users. You may want to learn the treble clef, using the recorder or violin, or the bass clef, for cello or double bass. Then again, you may wish to learn both for the keyboard.

Learners of keyboard instruments can opt to see a visual display of the keyboard, which they can "play" by moving the cursor keys left and right. This excellent addition is impressive.

If you select this option you must not only name the notes, but also "play" them on the keyboard when you are tested.

All in all, an excellent program. The amount of time and care taken in its production, as well as the knowledge and experience of the author on its subject matter, are abundantly obvious.

Karen Torevell

Clear the board

SOFTSPOT
TRANSISTORS REVENGE

IF somebody were to tell you that your components were revolting you might be a little upset.

Well it's true, but don't be alarmed. I'm not referring to your physical attributes, but to a new game from Softspot.

Transistors Revenge is one of their latest arcade games. After *RUNning the program, which takes about three minutes to load, you are presented with a combined key plan and high score table.

The game takes place inside the BBC Micro on the printed circuit board itself, and your task is to defend the CPU from attack.

Your enemy is a force of 50 mixed micro electrical components ranging from resistors, transistors and capacitors to diodes and fuses.

Their sole aim is to destroy the central processor, whose exalted position they envy intensely.

The screen layout is simple. The CPU is a rectangle in the centre of the screen and radiating from it towards the screen edges are the data lines.

they chase you relentlessly. Crush them with cleverly kicked ice blocks. Get three diamond blocks in line for a bonus. (Superior)

★ ★ ★

Horse Race: *Spend a day at the races. Study form, place your bets and follow your chosen horse in the hope that the jockey doesn't fall off. A game for one to six players which includes graphic detail such as mobile camera, waving spectators and tote and leader boards.* (Dynabyte)

★ ★ ★

Brain Teasers: *Six thought-provoking games. Noughts and crosses, 3D noughts and crosses, Reversi, Mastermind, Magic Squares, and Nim. All games use Mode 7 text.* (Dynabyte)

★ ★ ★

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★ ★ ★

3D Tank Zone: *Scan the terrain around your turret and position your cross sight on the enemy planes and tanks. Wire graphics create the landscape as you try to outwit and out-shoot the enemy.* (Dynabyte)

★ ★ ★

Elementary Statistics: *Three different programs introducing charts to display collective information and data. Choose the most suitable method from barchart, piechart, or scatter, according to your requirements.* (Garland)

★ ★ ★

Astro Maths: *Educational software for the seven to 15 age group. In two parts, the program tests the child's ability on 10 problems with selectable degrees of difficulty. The program moves on to part two with seven successful answers or more. This is a space shoot out game destroying the aliens by accurate positioning of the cross sight and laser fire.* (Scisoft)

★ ★ ★

StudyMaths 1: *Educational software for the nine to 13 age group which incorporates five different mathematical programs. Symmetry – drawing shapes. Fractions – which shape is the bigger? Shapes – name the shape. Factors – select the factors of a number from 10 given numbers. Battleships – a co-ordinate game.* (Scisoft)

★ ★ ★

Confrontation: *A strategy war game for two players. Using a pre-recorded scenario, or creating your own, activate and position your air and land forces in an effort to reach your own agreed preset victory conditions.* (Lothlorien)

★ ★ ★

Jungle Jive: *Taking a walk through the jungle, you are under constant attack on both sides from a variety of brightly coloured animals. Armed with only a rifle you must shoot them to survive to the next screen where you meet different animals as the game gets faster.* (Virgin)

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The enemy makes random attacks along these lines. You defend the CPU by moving from pin to pin and firing electronic pulses.

Should any component succeed in reaching your stronghold the CPU explodes in a mass of sparks, you lose one of three lives and start again.

A variety of tools – pliers, hammers, drills, and spanners – appear occasionally at the edges of the board.

They can do you no harm but if you can destroy them you collect bonus points. They take some hitting because of the speed at which they disappear.

Occasionally a mains spike appears which cannot be destroyed as it zips towards the CPU. However it will only kill you if it hits your fire pointer.

In cases of extreme pressure you have a Zap button available which will clear the board of everything in sight. But beware, it takes 20 seconds to recharge itself.

Each time you clear the board of the enemy a fresh onslaught appears and the game speeds up. After four cleared boards the printed circuit layout changes.

You score 100 points for every component hit, and a bonus of 500 for each tool you strike.

You gain one extra life when your score has reached 50,000 points.

A novel idea is that when the game is over you are given the option of entering the high score table or carrying on a new game from where you finished the last.

The program makes excellent use of graphics and sound and is infuriatingly addictive. Refinements such as a freeze game facility and a sound on/off option add to its professional quality.

All in all it is good value for money, is attractively packaged and the written instructions are clear and precise.

The verdict from my four young sprogs who played the game for hours between them was "Ace!".

Alan Sergeant

Off into the wide blue yonder..

HAVE you ever daydreamed that you're the pilot of a World War II Spitfire, barnstorming bridges, straffing buildings, and generally scaring the wits out of yourself?

Do you still get a lump in your throat when you see the nth rerun of Reach for the Sky?

If so, Acornsoft's **Aviator** package is the one for you.

Seated in the cockpit of what must be the most accurate and complete flight simulator yet produced for the BBC Micro, you can fulfil your heart's desire without ever leaving your armchair.

Included in the package is a 25 page manual, a large map and a keyboard plan.

The controls are well thought out and the manual is explicit and to the point, containing enough information to make you feel like a real pilot.

On loading the screen presents a 3D view of the runway, with the plane ready for take off. One quick consultation with the manual and you're in the air.

ACORNSOFT
Aviator
for the BBC Microcomputer Model B

Not that I managed to stay there very long at first, but with practice you soon get the hang of it.

The screen display is in Mode 5 black and white, so the instruments aren't too well defined. But as the program takes up so much memory it's hard to see how this could be improved.

Apart from this minor moan, the rest of the graphics are superb. Onlookers – and you'd better be prepared for lots of them – groaned with anguish as the simulator barrel-rolled at the hands of this maniac reviewer.

Not only did the engine tone fall and instrumentation flay wildly about, but the landscape, bridges and so on all turned realistically – as did my stomach!

Having regained some semblance of control I headed west across the river to the next test of my skill – flying under the bridge.

With a scream of "Geronimo" I set the Spitfire

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From Page 91

into a 250mph dive from 4,000 ft straight for the bridge.

Needless to say that attempt failed miserably. However, I did manage it eventually.

Some way to the south west of the airstrip lies the sleepy little hamlet of Acornsville.

Surrounded by open fields and beautiful rolling countryside, it's the ideal place to practice your aerobatics – if your nerves are up to it.

And you'll want to practice – in the main program, points are scored for performing tricky manoeuvres such as flying under bridges, flying between buildings and landing.

For the more ambitious, double points are awarded for completing the flying manoeuvres upside down! *(The plane, that is.)*

If all of this wasn't enough, Acornsoft have included a games theme in which you try to save the occupants of Acornsville from marauding intruders from outer space.

Rather odd in a Spitfire, that, but still, it's the game that counts.

Just to spice things up a little, the game is played in real time. So I would advise you to learn to fly the thing before you attempt this final challenge.

Sadly, space just does not allow me to elucidate further on my exploits with this truly excellent simulator.

Suffice it to say that Aviator is a very exciting game to play, and should give hours of pleasure to all budding pilots.

Marcus Adams

New look at invaders

A FAIRLY novel variation on the Space Invaders theme is **Cosmic Kidnap** by Superior Software, in which you are the Autoguard in sole charge of a space jail.

Your captives are the three most important aliens that ever existed and your aim in life is to prevent your precious guests from being rescued by their alien comrades.

The game is simple in concept. There's the normal laser base (your blaster), which you can move left and right at will, dodging between the shields. In the centre of the screen is the jail, enclosing your charges.

The aliens steal in from the edges of the screen, rapidly removing the building blocks of the jail, at the same time dropping bombs on you.

If any alien gets to a captive and manages to remove him you explode and lose a life – in addition to any you have lost by being bombed.,

At regular intervals the alien mothership zips across the top of the screen. You hit it for bonus points.

My only criticism of the game is the ear-splitting shrill whistle that the ship makes as it travels across the screen. It really is oppressive, although I suppose if you got deeply involved with the game you could ignore it after a while.

On clearing a screen you are met by a new swarm of aliens intent on rescue, and in later stages additional enemies appear presenting new problems.

If you think the Space Invader genre is dead, try this one. It's an unusual version that kept my kids enthralled for hours.

Alan Sergeant

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Grapevine is simply the most versatile modem available, at the price, for home or business use. It offers Viewdata/Prestel baud rates (1200/75) alongside 300/300 baud full duplex for communication between the BBC and other computers.

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Grapevine utilises RS232/RS423 interface standards with a 5 pin domino din connector. It is supplied complete with the appropriate lead for connection to the BBC micro, other leads are available on request.

The BBC microcomputer requires communications software to operate Grapevine. This is provided by Commstar, the intelligent communications eprom from Pace. Commstar is extremely flexible and provides numerous commands to transmit, receive, save, load or transfer data. By using Commstar it is possible to access Prestel, Micronet, Homelink, Telecom Gold, and various 'Bulletin Boards' throughout the country. Commstar can be used to emulate other terminals simply, (e.g. VT 100), by means of a configuration disc.

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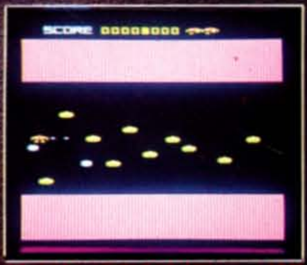
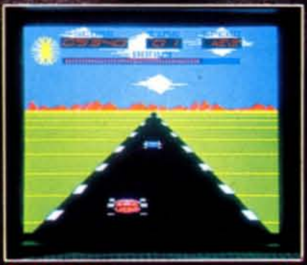
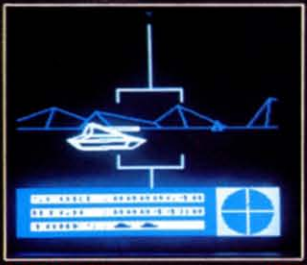


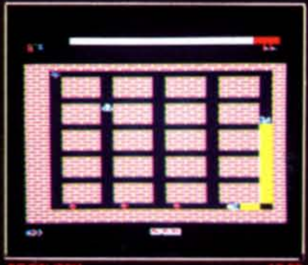
BORIS IN THE UNDERWORLD (32K) £7.95
A novel arcade-style game in which you take the part of Boris, who has had his home raided by the underworld creatures. They have stolen most of your possessions and your task is to venture into the underworld to retrieve your valuables by fighting off the underworld creatures. The walls of the underworld close in and you will be vapourised if they touch you. Can you retrieve all of Boris's possessions from the underworld?
●●●NEW RELEASE●●●



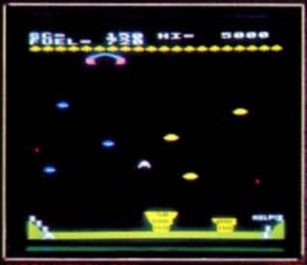
OVERDRIVE (32K) £7.95
A highly-addictive multi-stage 3D race game. You steer your car left and right, accelerate and decelerate as the opposing cars weave about the road. There are five different stages including night, snow, desert, and riverside scenes. Incredible graphics give the impression that you really are taking part in the race. Highly recommended, and destined to become another top-seller for Superior Software.
●●●NEW RELEASE●●●



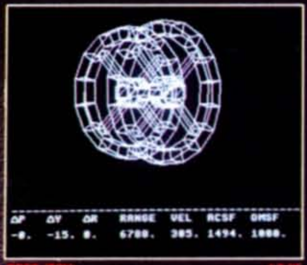
BATTLETANK (32K) £7.95
An excellent game, made possible on the BBC computer only by the unique use of a dual-screen display and specially written plotting routines. You are a tank gunner looking out onto a mountain plateau. You see the distant mountains and the pyramid obstacles – and also the enemy tank. Position the tank in the rectangular viewfinder by fine adjustments of your controls...then fire! (KEYBOARD or JOYSTICKS).
●●●NEW RELEASE●●●



ROCKY (32K) £7.95
A new concept in arcade-style games. Your task is to save yourself from patrols of mutant robots by dropping rocks on them. Each of the robots has a single large eye which emits a yellow beam of light. Being caught in this beam reduces your strength and, if you are not carrying a rock, causes the robot to metamorphose. It may change into either a spectre or a cruncher.
(KEYBOARD or JOYSTICKS)
●●●NEW RELEASE●●●



MOON MISSION (32K) £7.95
Moon Mission is a fast-action machine-code game featuring superb graphics, sound effects, hi-score, and rankings. Your mission is to rescue the six astronauts stranded on the moon by steering your spaceship through the meteors and space-mines. The game starts relatively slowly, but from sheet to sheet not only does the speed increase, but also the number of meteors, space-mines, enemy spaceships, and fireballs.
●●●NEW RELEASE●●●



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[illegible] (32K) £7.95
A space docking simulator using 3D graphics to model the motions and responses of the ORION 4 spacecraft. Your mission is to pilot the shuttle to a "soft dock" with the space station. PITCH, YAW, ROLL, FORWARD, LATERAL and VERTICAL engines are provided together with orbit manoeuvering booster engines. 6 skill levels provide for the completely inexperienced pilot as well as the fully-fledged commander.

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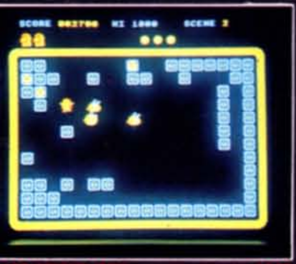

ERCY PENGUIN (32K) £7.95
he best version available for the BBC micro. Percy s trapped in an ice maze which is populated by the eadly Snobees. His only hope of survival is to quash them by hurling ice cubes at them. nfortunately, whenever it seems that he has won, deadlier breed appears. Hi-score, rankings, xcellent graphics and sound.
KEYBOARD or JOYSTICKS).
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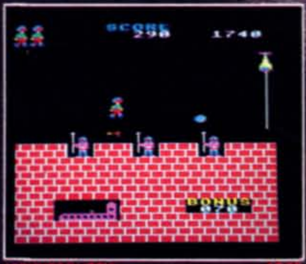
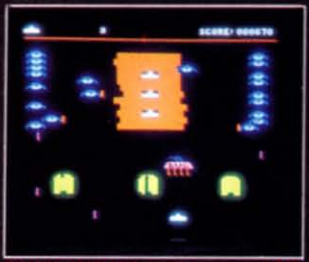


HUNCHBACK (32K) £7.95
An excellent version of the arcade game where Quasimodo attempts to rescue Esmeralda. Beautifully detailed animation as Quasimodo leaps over the ramparts. Twelve different screens of action! This program is sold under licence from Ocean; we have exclusive rights to its sale for use on the BBC micro.
(KEYBOARD or JOYSTICKS).
"...an extremely good version of the arcade game...thoroughly recommended."
...BEEBUG MAGAZINE



COSMIC KIDNAP (32K) £7.95
The best version available for the BBC computer. In Cosmic Kidnap, you take the role of the Autoguard in charge of your side's three most important alien captives. Suddenly, you hear explosions ... your jail is under attack by a fierce swarm of aliens. The game becomes increasingly difficult from screen to screen, and bonus points are scored for hitting the mother ships. A fast-action arcade-style game.
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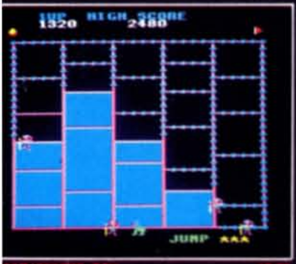

RAZY PAINTER (32K) £7.95
he only full-feature version available for the BBC icro. On the first screen, you take the part of a onkey being chased by African tribesmen. The onus screen features the monkey trying to reach is bunch of bananas. After that, you take control of paint-roller and each square painted-in adds to our score.
EYBOARD or JOYSTICKS).
Great sound and graphics, smooth and accurate nimation, responsive and simple controls..."
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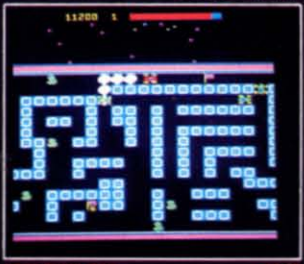
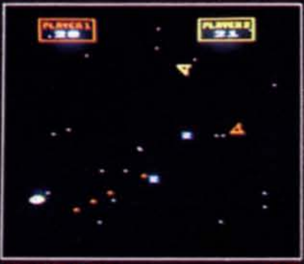


ROAD RACER (32K) £7.95
The only full feature machine-code version available for the BBC micro. Features include: scrolling screen, radar display, 3 pursuing cars, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty, and sound effects.
(KEYBOARD or JOYSTICKS).
"The game becomes very hard and has very smooth graphics. Excellent." ...BEEBUG MAGAZINE



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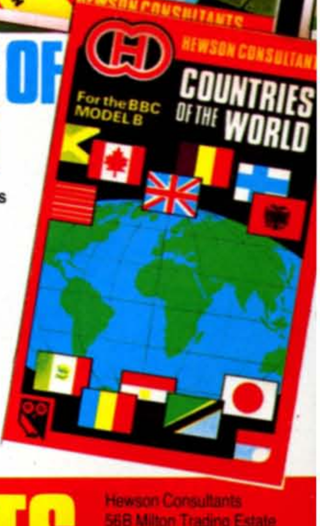
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MIKE COOK'S PROBLEM PAGE

Curing annoying sound on vision

I HAVE recently bought a BBC Micro and I find that when it is generating sound, interference is seen on the television screen in the form of lines rolling vertically.

At the shop where I purchased it a second machine was found to do the same.

This interference is especially visible on a red background.

The retailer told me that on ringing Acorn they were informed that this interference does not constitute a fault.

I'm rather reluctant to believe this because two workmates who also own BBC Micros don't seem to have this problem.

What I would like to know is whether this "sound on vision" interference is displayed by all machines and the possible cause of it.

This interference is seen clearly when running the "Music" program on the demonstration tape. – *S. Anwar, Coventry.*

● This appears to be a fault with some combinations of computers and TV sets.

The "Acorn cure" is to cut the power lead going into the modulator and to insert a 10 ohm resistor into it. Then connect a 100uF capacitor between the modulator side of the lead and the modulator case.

This should smooth any supply ripple getting into the modulator and help reduce the interference.

My cure is to solder some wires from the power lead directly to IC 19. Pin 4 of this IC should be wired up to the 0 volts lead and pin 6 to the +5 volts lead.

This reduces the impedance of the power supply as seen by the audio amplifier, thus inducing less interference for the modulator to pick up. In extreme cases you might have to do both.

Harnessing 8in discs

I REFER to your article in the January 1984 issue of *The Micro User* concerning the Acorn DFS.

What has prompted me to write was your remarks about 8in floppy discs being used on the BBC Micro.

Naturally Acorn were not forthcoming, but I and many others would greatly appreciate an article on how to connect them up as I have a beautiful pair of Memorex 8in drives complete with PSU and I know two friends of mine who have similar drives – IBM and Shugart – waiting to fit them.

I have been using a pair of Shugart 5¼in drives (35 track though) since June 1983 but my filing system is becoming too large – 1,400 discs actually in use and a further 720 8in discs awaiting use!

I would greatly appreciate a reply or better still an informative article in *The Micro User*. – *Graham Sawyer, Stapleford, Notts.*

● It is possible to use an 8in drive with the BBC Micro, but a few links will have to be changed and tracks cut.

Having done this the Acorn disc filing system will not allow you to use the full capacity of the disc.

To the rescue comes Vogan Products, The White House, 21 Grove Road, Hazlemere, Bucks. HP15 7QY. They produce 8-DFS which is an eprom disc filing system for 8in drives.

They say the product is compatible with the Acorn DFS and written with Acorn's complete cooperation. The documentation describes the modifications that need to be made.

The extra space is created by making the 8in disc look like two drives to the software by having two directories.

I hope this helps you to cut down on your disc consumption.

An eye on the PSU

AN increasing amount of software is now becoming available in ROM or eprom and there is only limited space in the BBC Micro to fit them.

As the system can support up to 16 sideways ROMs several firms are now producing add-on sideways ROM boards to allow for all 16 ROMs to be fitted at once.

I am a little concerned about

→

A FEW bugs seem to have crept into some of the Body Build circuit diagrams. In the March 1984 issue of The Micro User, Figure II shows VR1 as 100K. It should be 100R, as stated correctly in the parts list.

Also some of the ZN427 ICs will work even faster than the clock adjustment provides for. If this is the case with yours you can reduce R4 to 75R or even remove it altogether, replacing it with a wire link.

The real time clock in the February 1984 issue has a few problems as well. The four data lines D0 to D3 have been transposed on the diagram on Page 117.

So the connection labelled D3 should read D0 and D2 should read D1, etc. To make matters worse, in the kits there was an error on the first issue of the printed circuit board.

Look under the battery, and if it says RTC1 then you need to do a small mod to stop the battery discharging when it is left connected to a switched off computer.

Remove resistor R1 and resolder it across the diode marked D2, either on top or on the copper foil side.

If you have the second issue board with RTC2 on the underside of the printed circuit there is no need to bother.

The component suppliers presented us with a mixed box of BC182 and BC182L transistors.

The two transistors are identical except for their pinout.

As the board was laid out for the BC182 an errata sheet was included in the kits. You should check carefully which type of transistor you have and only take notice of the sheet if you have the BC182L.

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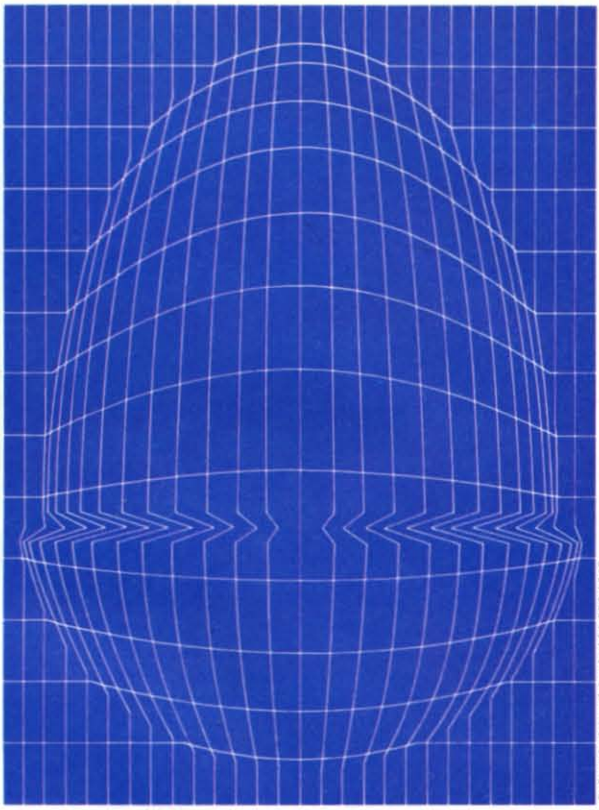

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From Page 99

whether the PSU can take the extra load of all 16 ROMs in addition to my disc drive which is already powered from the power outlet of the micro.

Presumably if I converted my single drive to a double drive this would further increase the load.

A dealer told me that it should be all right, but didn't seem to be very sure and finally said that he hadn't yet tried it himself.

Could you please let me know if 16 ROMs and dual disc drives (modern slimline type) are likely to overload the PSU of the BBC Micro? – *Michael Lowe, Loughton, Essex.*

● A dual disc drive alone is likely to overload the internal power supply, as sometimes it cannot cope with surges that occur when the drives turn on.

A symptom of overload is unexplicable disc errors or the machine freezing up.

It is unusual for this to cause permanent damage to the machine although obviously the machine will not work reliably.

Conversion connections

I HAVE recently upgraded my model A to B using a conversion kit from one of your advertisers and with reference to your article in the April issue of *The Micro User*.

The following points were not made in the magazine text (but maybe in the kit instructions):

☐ 1. STROBE Q11(c)→PL9, pin 1 should be pulled up with 2k2. Connect between IC27 p4 and Q11(c) – middle pin of the three. This is R170. Check also continuity between Q11(c) and PL9, pin 1.

☐ 2. Track to PL9 pin 23 should go to pin 19. This line should also be pulled with 4k7. Use the two plated through holes adjacent IC70 pins 11/13. This is R162. The circuit on page 503 of the User Guide shows this correctly.

☐ 3. Some printers (Microline 80, Star Gemini 10–x) object to the OV on p.26 of PL9. Isolate this pin under the socket, thus maintaining buss continuity on PL9. P26 should be isolated on both sides – it also sees OV from IC83.

Again the User Guide correctly shows this connection not made.

The above refers to issue 2 and 3 boards only. Issue 4 and 7 should be okay.

Any articles on printing in the pipeline? – *C.J. Young, Kings Norton, Birmingham.*

● Thank you for your help, it might clear up some problems if you had one of the early computers.

The extra operations were not part of the upgrade from a model A to a model B but rather minor fixes to the Issue 3 board. None are strictly vital.

☐ 1: Provides a pull up resistor for those printers not having one at the receiving end.

☐ 2: Helps stop the buzzing noise in the speaker found on some Issue 3 boards.

☐ 3: Is for fussy printers.

Chips in spot 69

I HAVE a cassette game by Acornsoft bought for me with the best intentions. However I have a BBC Model A partly upgraded to 32k.

Consequently it will not load, but tells me that IC 69 is missing. Since my machine is a Model A this does not surprise me.

I also assume that whatever chip it is will normally be part of the full upgrade.

I am not wanting a full upgrade because a printer is far too expensive.

Therefore can you please answer the following questions:

- What IC goes into position 69?
- Is that all I need to allow me to use the Acornsoft cassette, or and other proprietary sort?
- Who can supply me with the appropriate chip? – *A. Fletcher, Lowton, Warrington.*

● In answer to your three questions, IC69 is a 6522 VIA chip, this is all that is needed, and you can get it from Watford Electronics.

Not on the air

AS the BBC Micro transmits a strong carrier slightly less than 28.0MHz must we all buy CB radio licences or has Acorn a suppression system to prevent illegal transmissions?

The carrier appears when almost any program is run and without the need for VDU or any peripherals to be connected. – *Martin T. Pickering, Bedale, North Yorkshire.*

● The BBC Micro produces considerably less radio frequency interference or "hash" than most other computers. No licence is needed.

Teletext adapter

CAN you tell me whether I have to purchase the Teletext adaptor to enable me to receive and record on cassette BBC teletext computer programmes?

Seeing that I already have a Sony teletext set surely a much simplified unit (and much less expensive) should do the job.

The Sony set has provision for a video recorder and I wondered if BBC Micro video out plugged into this would improve display quality – *W.A. Slade, East Ham, London.*

● My motto has always been that anything can be interfaced to anything else.

However to modify an existing teletext decoder to interface with your computer you would need to isolate your TV from the mains with a large transformer.

Then you would have to tap into the RAM on your teletext by inserting data select switches on the address lines and buffers on the RAM output lines.

Having done this you would then need to feed it into your computer through two VIAs interfaced to the 1Mhz bus. Finally you would need to write the software to drive the modification.

All in all this is a major and complex project, and not worth the effort in both time and cost.

* * *

I AM interested in the Beeb Body Building kit number four. Do I need packs 1 and 2 to go with it – I have the BBC model B.

Also are wiring instructions for the same included. – *C.C. Kellam, Sheffield.*

● Yes you do need the packs. To find out exactly how to use them you'll need the July 1983 issue of *The Micro User*.

* * *

I WOULD be most grateful if you could tell me how the BBC Micro can distinguish between ROMs and eproms in its language sockets, as the enable lines for ROMs are positive to select and negative to select for eproms. – *W.H. Walker, Leighton Buzzard, Beds.*

● You are wrong. The select line for both ROM and eprom is negative to select.

SPOT THE REAL ISSUE 3 BOARD

FOLLOWING the letter entitled "Look, no mods!" in the January 1984 issue of *The Micro User* I wonder if your super sleuths could find out the serial numbers of the boards which were screen printed "Issue 3" when they were really of the "Issue 4" variety.

Such information could determine whether a DIY approach becomes a possibility or not. – *E. Atkinson, Keighley, West Yorkshire.*

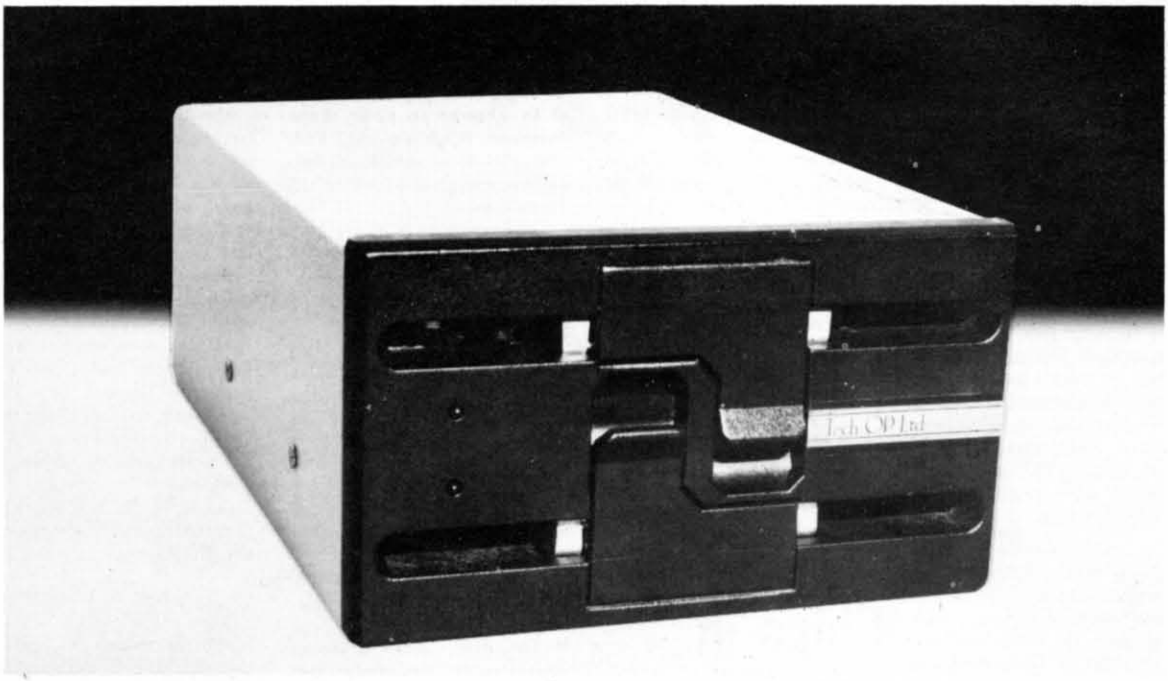
● There are lots of changes in the layout between an Issue 3 and Issue 4 board. Perhaps the easiest to spot is the small plastic block – usually blue or yellow – on the very edge of the board next to IC98.

This IC will just be an empty socket unless you have the speech chips fitted. It is to be found on the left hand side of the board about half way up.

If this block is missing you have an Issue 3 board. Page 64 of the April 1983 issue of *The Micro User* has a large photograph of an Issue 3 board.

Issue 4 boards are considerably different around the top left hand corner – the Econet region of the board.

You've got a problem with your micro and you just can't sort it out on your own? Then write to MIKE COOK. If he can't help then probably no one can . .



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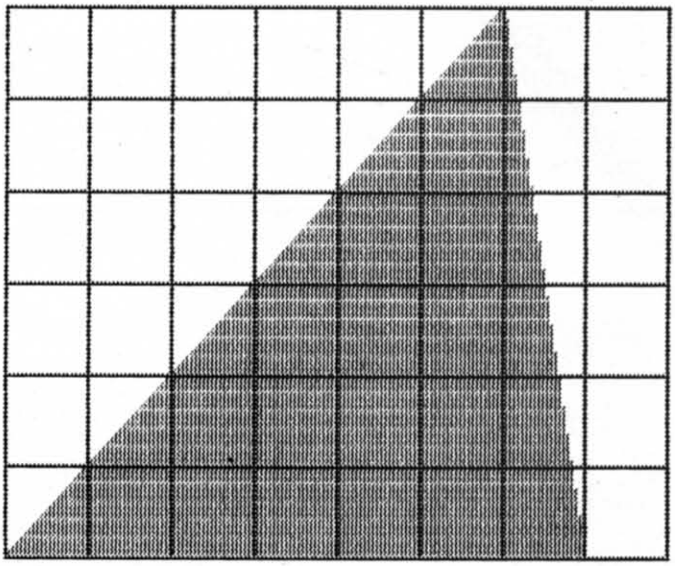
Shape up to maths



By JOHN LORD

AFTER being rather critical of most mathematical software I have seen, the Editor threw down the gauntlet: "Let's see if you can do better".

So here is my first sample, a program to help children from eight to 14 years old to learn about area.

The user is asked for the length of the base, followed by the height and area of assorted rectangles, parallelograms and triangles. Each input is terminated by pressing Return.

The program makes use of the BBC Micro's ability to draw shapes quickly and clearly on the screen and attempts to trap errors as they occur.

The Escape key is not disabled but is used to return the program to the menu.

The Break key is programmed to re-run the program, so making it difficult for children to get out of the program and play havoc with it.

Some idea of the robust nature of the program was provided by the mother of one of my pupils, who after using it announced: "I'm fed up with this computer. It won't let me make mistakes without printing sarcastic messages!"

Sometimes I think these messages really make the program for some of my pupils. But learning and enjoying yourself can't be all bad, can it?

Input validation is performed with the ubiquitous REPEAT . . . UNTIL correct loop.

The data entered is compared with the correct value. If incorrect then PROChelp is called and a suitable response is printed.

MAIN PROCEDURES

PROCoptions	Prints the menu and deals with the selection.
PROCparallel	Draws and fills either a rectangle or a parallelogram. If the offset, 0%, is zero, then the shape drawn is a rectangle.
PROCtriangle	Draws and fills a triangle.
PROCdrawgrid	Superimposes the grid on the shape.
PROCtext	Handles the printing of the prompts and the positioning of the cursor on the screen.
PROChelp( )	Handles the entry of incorrect responses to data requests. It prints a message and clears the incorrect response before allowing the next attempt to enter the data.

MAIN VARIABLES

x0,y0	Coordinates of the bottom left hand corner of the grid.
inc	Width of each of the boxes in the grid.
X%	Actual base of the shape.
Y%	Actual height of the shape.
0%	Offset in the parallelogram.
base	Inputted value.
height	Inputted value.
area	Calculated value.

Full listing starts on Page 161

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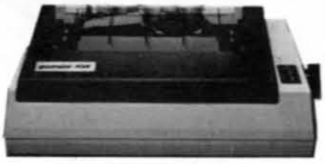

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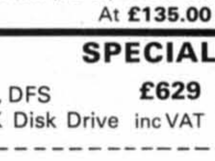

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The keywords are all described in chapter 33 of the User Guide. However what we want is something geared more to the beginner.

We're looking for a clear, easy-to-read description of the keyword that will give the novice a general outline of its workings. To this end, we'd also like you to supply an illustrative program.

You can choose any keyword, but you've only got 500 words to describe it in – and we'd like you to restrict your program to 10 single-statement lines!

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All in all, it's a prize well worth making that extra effort for. And even if you don't win, your efforts won't be entirely wasted. If your description is good enough we'll publish it in *Micro User*, paying at our standard rates.

Who knows, it could be the start of a new career for you!

£300 software for Adrian

WINNER of our March competition was Adrian Holmes of Bromsgrove. His task was to sort eight ROMs into order of usefulness for the typical BBC Micro owner, and to describe the piece of software he'd like to see on ROM.

The winning order was B, H, E, C, G, D, A, F and the software he suggested was a program to increase characters to any size to make life easier for the visually handicapped.

Adrian's prize is £300 worth of ROM-based software from Watford Electronics, plus the ROM board to put them on.

Send your entry, not later than June 30, 1984, to: Second Processor Contest, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

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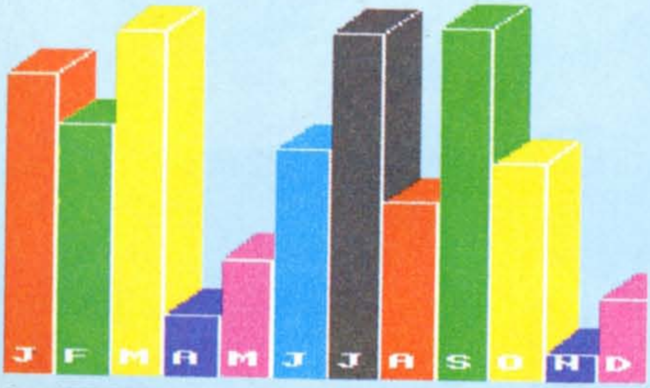

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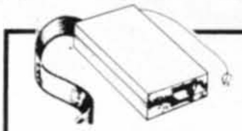

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Lifting the lid off the 8271

THE BBC Micro's disc controller, the 8271, is a mysterious chip. Its impenetrability is heightened by the difficulty of getting hold of the specifications. They are only available in an Intel chip handbook costing about £18.

Here MILES GOOBY sheds light on the subject. And we present a Toolkit of 8271 routines you can incorporate in your own code.

IN the March issue of *The Micro User* an excellent article by Mike Cook gave a nuts and bolts description of the floppy disc, explaining about sectors and tracks, giving the format of a sector, and also an account of what the 8271 chip does.

As Mike says, it stands between the DFS and the disc drive. It allows the DFS to issue a command and then go and do something else while the 8271 tells the drive in great detail the sequence of actions needed to perform the DFS's request.

To give an idea of the actions underlying something as apparently simple as loading a program, let's assume that the first sector of the program is number &98 on the disc and that the program is &4BA9 bytes long (the DFS command *INFO will tell you this).

This information is kept in the catalog so the two catalog sectors must be read first. This requires the following command to be sent to the 8271:

Read 2 sectors from track 0
starting from sector 0

The disc drive itself cannot deal with such a high level command and the FDC (floppy disc controller, the 8271) must therefore break it down into the following sequence of commands which the drive can handle:

1: *Find out which track the head is on.*
2: *Set the stepping direction to outwards (towards track 0).*
3: *Step the calculated number of tracks.*
4: *Lower the head.*
5: *Read the next sector ID coming under the head.*
6: *Check the track number.*
7: *If it is not track 0 give an error.*
8: *If it is track 0, check the sector number.*
9: *If the sector number is not 0, go back to 5.*
10: *If it is sector 0, read in the data.*
11: *Go back to 5 to get sector 1.*

As you can see, the disc controller is really a special purpose microprocessor. Since the data bits come from the drive at 125,000 per second it has to move pretty fast too.

Having read the catalog information, the DFS knows where the first sector is and the length of the file. As &98 is 152 in decimal, this means the starting sector – at 10 to each track – is on track 15 and is number 2 (the third, starting from 0).

The length of the file is &4C sectors, 76 decimal. So &4BA9 takes &4B sectors plus &A9 bytes of the &4C'th sector. The remaining &57 is unused.

This means the file is contained in sectors 2 to 9 of track 15, sectors 0 to 9 of each of tracks 16 to 21 and finally sectors 0 to 7 of track 22.

Now the disc controller can read more than one sector when commanded, but can read them only from the same track. It cannot move to the next track and continue from there, so the DFS must send the following commands to it:

- *GOTO track 15 and read 8 sectors starting from sector 2.*
- *GOTO track 16 and read 10 sectors starting with sector 0.*
- *GOTO track 17, and so on.*
- *... similarly for tracks 18 to 21 ...*
- *GOTO track 22 and read 8 sectors starting with sector 0.*

This example shows some of the 8271 commands in action. It has in fact got 15 commands with variants. The major ones are illustrated in the assembler program given (Listing I).

It is possible to issue the commands by writing and reading the FDC's registers, but this is harder than using the direct chip access command in the DFS.

One can be forgiven for not knowing there is one as the official Acorn disc manual has only a passing reference – quite remarkable in its obscurity – to the use of OSWORD with A=&7F.

This is the key, and the Watford and Pace disc manuals are much more forthcoming. The Watford manual gives the commands to verify, format and read the sector headers, too.

The call through the DFS needs the drive number and a buffer address followed by the FDC command and parameters. It uses the drive and buffer itself and passes the command and its parameters on to the 8271 with all the correct bowings and scrapings.

So to use the disc controller chip directly the call is, in Basic:

```
A%=&7F
X%=fcb MOD 256
Y%=fcb DIV 256
CALL osword
```

where fcb is declared as:

```
DIM fcb 12
```

and the bytes of fcb are set up by the following code:

```
fcb?0=drive
fcb!1=buffer
fcb?5=no_of_params
fcb?6=command
fcb?7=param1
fcb?8=param2
... &c. ...
```

Byte 0 of fcb is set to the drive number, bytes 1 to 4 are set to the address from which the data is to be written or into which it is to be read, byte 5 contains the number of parameters the 8271 command requires, byte 6 is the 8271 command (+ &40 – I don't know why) and bytes 7 onward contain the parameters.

The 8271 sets its result register to a completion code which acts as an error code if the command cannot be completed satisfactorily. The DFS returns this code in the byte following the last parameter.

With the Toolkit routines (Listing I), you are spared the necessity of writing and modifying the above code as it has all been put into assembler with a simple interface to Basic through the resident integer variables.

The code as written is for Basic II. Listing II shows the lines to be altered to convert it to Basic I. *(Note that these are changes to Listing I. Listing II is not a program in its own right.)*

If you have this month's *Micro User* tape then you should load FDCBas as normal and then enter:

```
*exec FDCBasI
```

This will make the necessary alterations to the code to make it suitable for Basic I.

Full listing starts on Page 143

THE TOOLKIT ROUTINES

THE Toolkit routines have been tacked on to the end of an example program written in Basic which shows how they may be used (Listing I).

They are preceded by a jump table so that the address used to call a particular routine will remain unchanged should the code be moved about by adding or removing instructions or even by adding further commands.

Following the jump table is the OSWORD parameter block and declarations for the 8271 commands. The parameters for each routine are passed from the Basic program through some of the resident integer variables.

Before calling any of the routines, the parameters for the drive and the address for the buffer must be set up. This is done by setting B% to the buffer address and D% to the drive number and calling the routine *initfcb* through the address *init*.

If, later on, you want to change the drive, only D% needs to be changed.

To use the READ routine, the track and sector within the track and the number of sectors to be read need to be specified. The track in T%, the sector in S% and the number of sectors in N%.

Note that the 8271 cannot change tracks while reading, so only 10 sectors can be read when S% is 0, 9 when it is 1 and so on. Make sure there is enough room in the buffer for the data read – 10 sectors is 2,560 bytes.

The WRITE routine takes the same parameters in the same variables as the READ routine, only the bytes are taken from memory and put onto the disc.

With both the READ and WRITE routines, multisector operations are much quicker than a succession of single sector ones, as the 8271 doesn't have to come back to the DFS and the DFS come back to the program in between each sector.

As Mike Cook's article in the March *Micro User* explained, before a disc can be used, each of its tracks must be formatted. That means the 10 sectors – sector headers followed by a data field – must be written on to each track so the FDC can find where it is. Figure III of his article is a diagram of the sector layout.

The FORMAT routine needs only the number of the track (in T%). It then sets up the sector headers for the track in the buffer. It needs 40 bytes for this – four bytes for each sector comprising track number, head number, sector number and sector length.

These are then passed to the FDC which makes them up into proper headers and writes them to the track with the following data field being set to all *e* (&E5).

The sector addressing data is used by the FDC to make sure it is on the right track (!), find the sector it has been asked to READ/WRITE, and from the sector length, tell how many bytes it has to transfer.

The sector can be any length in the series 128, 256 ... 16384 bytes, though even with one big sector per track you will find it hard to get more than 2,048 bytes on it.

The READ ID routine will read N% sector headers from track T% into the buffer. The first header will be the one immediately after the index hole.

If you read the tracks on a disc formatted by the Acorn formatter FORM40, you will find that the first sector after the index hole on track 0 is number 7 and on track 1 it is number 8.

This is to make it more likely that the wanted sector on the next track will be close to the head when the head moves from one track to the next.

The MKCAT routine is intended for use after the whole disc (or at least track 0) has been formatted. It writes an empty catalog (Acorn style) in sectors 0 and 1.

An empty catalog is all zeros except for bytes 6 and 7 of sector 1 which contain the number of sectors on the disc – &190 for a 40 track, &320 for an 80 track disc.

The seek operation only requires the track (in T%). Note that all that happens is the 8271 sends (T%-current track) pulses to the drive's stepper motor.

If by any chance the motor misses a step, the 8271 has no way of knowing and it must read the information put on the track while formatting the disc to be sure it is in the right place.

If an error occurs during any of these operations, a message is printed instead of just an error number.

The Basic program provided is intended to illustrate the use of the routines – it should not be used as a Disc Doctor.

For one thing, the formatting will assume that a whole disc is to be formatted if the first question – "Enter no.of tracks" – is answered by 40 or 80 and will assume that only a few specified tracks are to be reformatted otherwise.

You can't format 40 consecutive tracks on an 80-track disc with the program as written.

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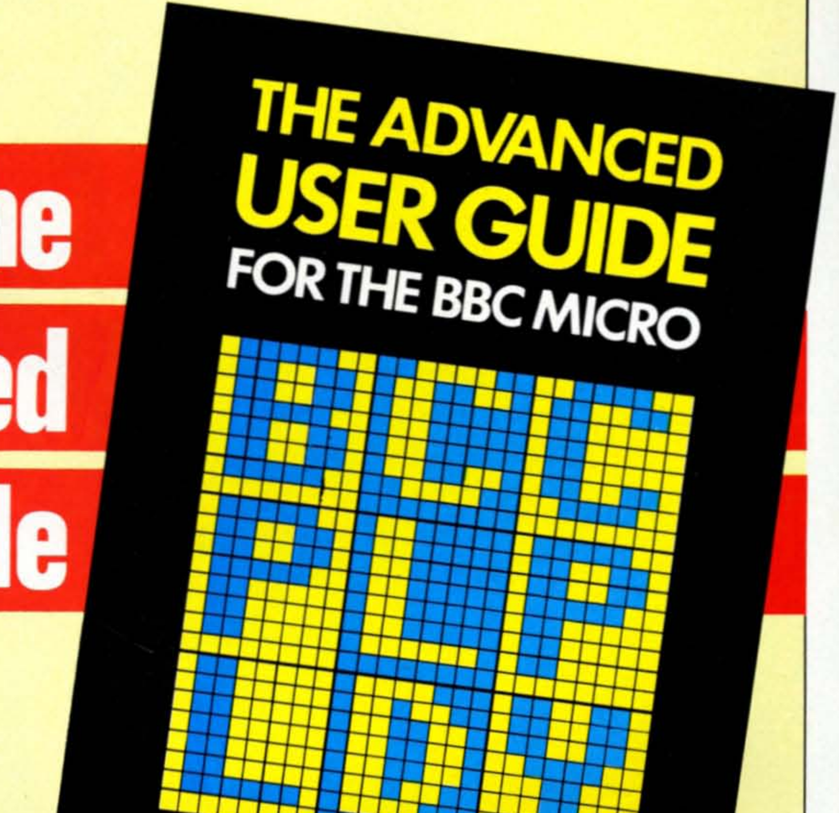

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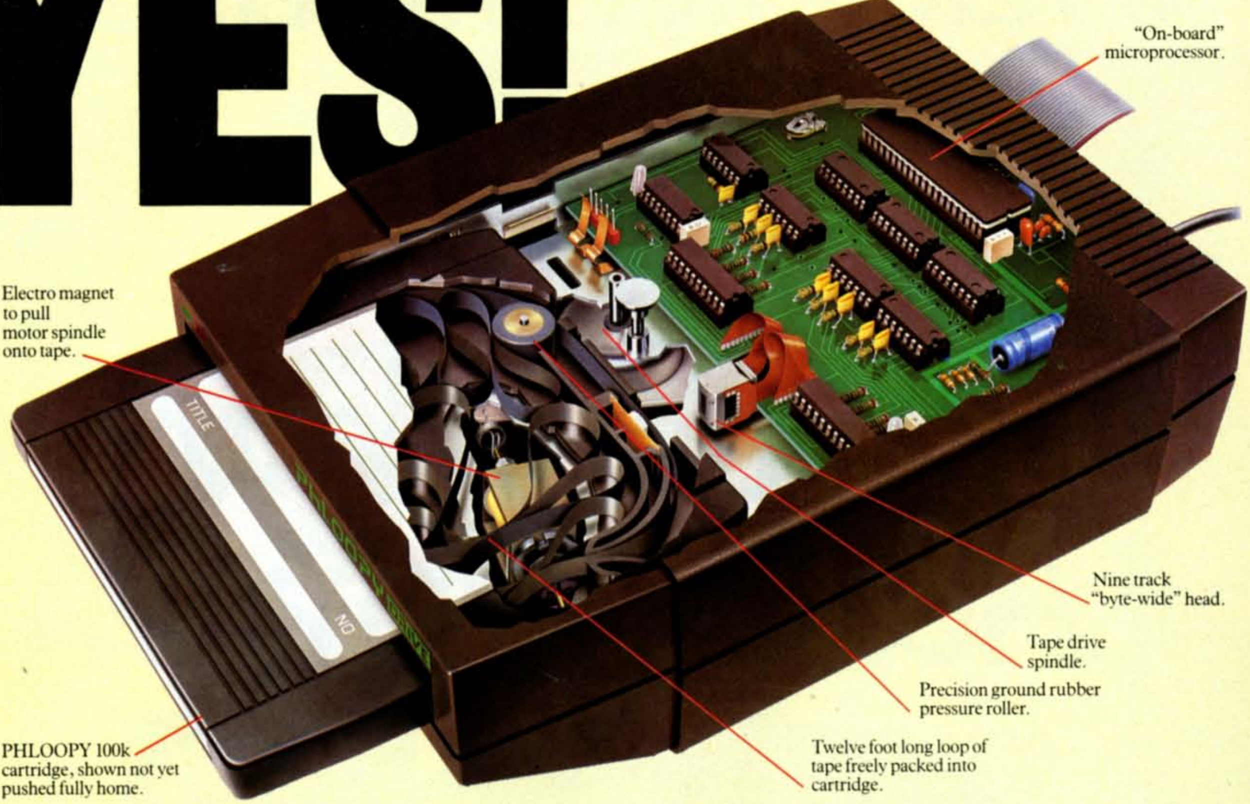
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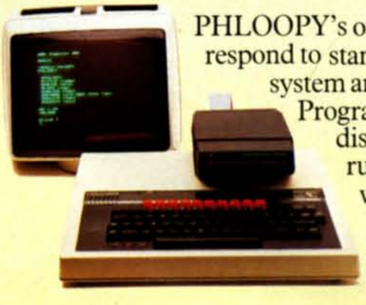

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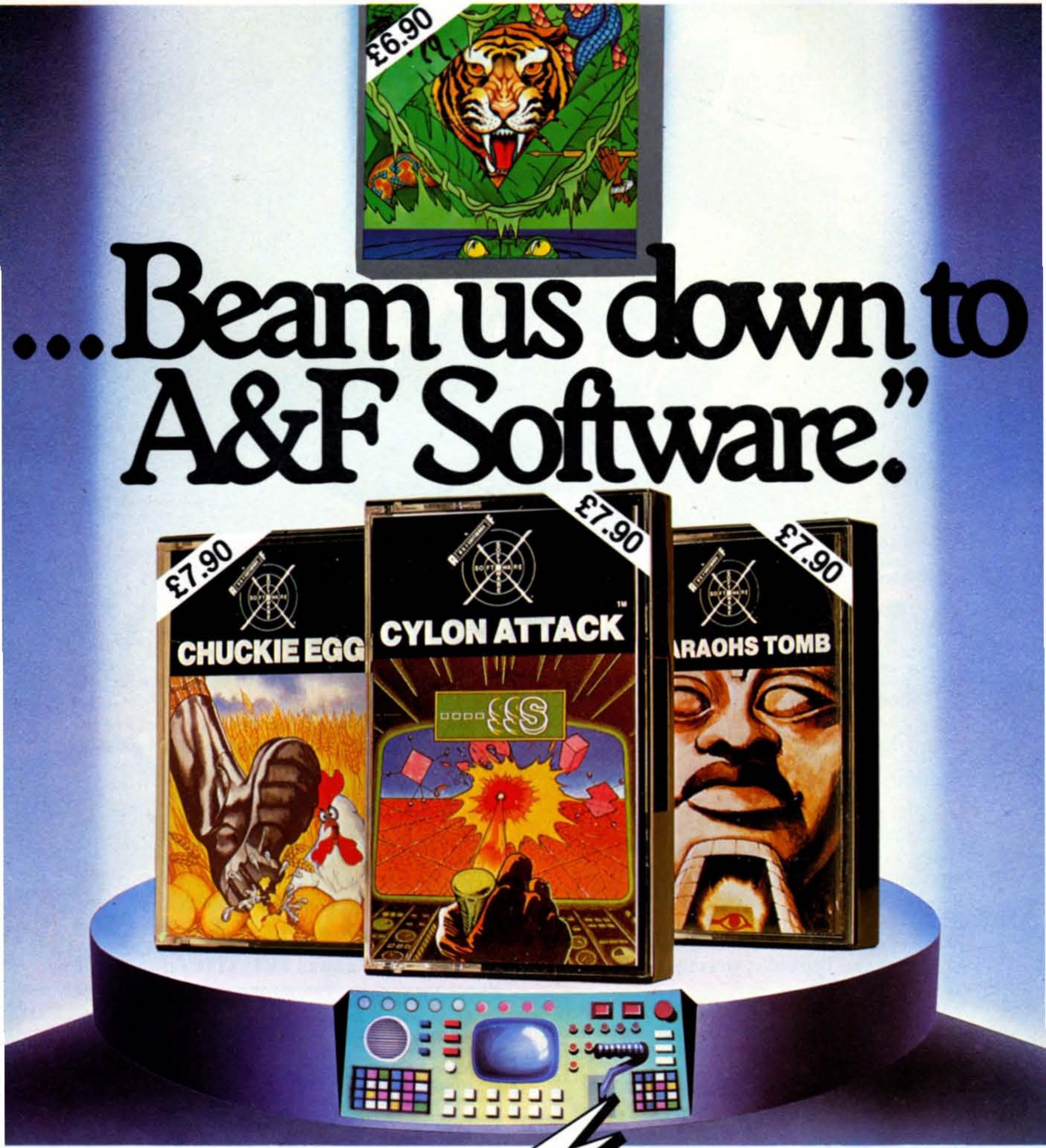
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Armdroid *Colne Robotics*

ROBOTICS is an area of computer control which is becoming increasingly popular, both with educational establishments and home enthusiasts.

Now that the cost of the controlling computer has reached affordable levels, the major stumbling block for those interested in this area has been the mechanical side.

Very few people with the mechanical skills to build a robot have the electronic and computing skills to control it and vice versa. Therefore there is a need in the market for a low cost mechanical robot device.

This has been filled by various manufacturers by the use of mobile boxes, turtles, buggies and so forth.

Interesting though this approach is, I have found them to be very disappointing in practice.

The need for a large, flat uncarpeted area, and the problem of them getting tangled up with their umbilical leads, limits their uses, even for educational purposes.

However, Colne Robotics has produced a BBC version of its computer-controlled robot arm, called Armdroid. It is driven by six stepping motors and is constructed of robust sheet steel.

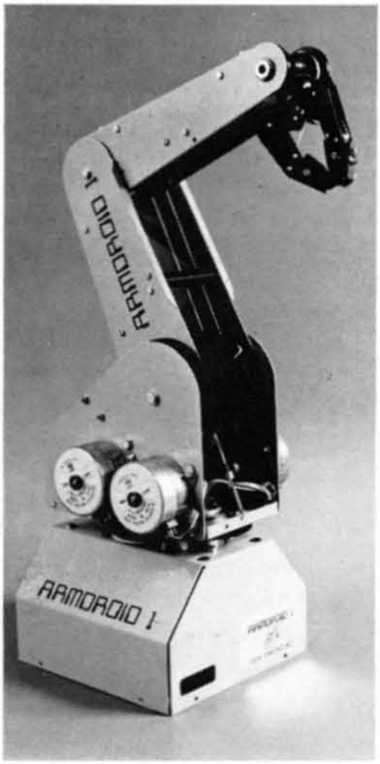
The motor movement is transmitted to the various sections of the arm by a Heath Robinson-like collection of plastic gears, ribbed rubber belts, pulleys and twine. Despite this, it operates quite effectively.

At the end of the arm there are three fingers that can close and grip an object.

The arm is available either ready-built or in kit form. The most difficult part of assembling the kit is stringing up the pulleys.

Construction of the arm would make an excellent group project but is quite a time-consuming task that should not be undertaken lightly. The ready-built version is well worth the extra money.

The documentation, although a bit tatty, shows exploded mechanical drawings of all parts of the arm. So if you do buy it ready-built you will know how to take it apart.



The stepping motors take a fair bit of current and so a separate power supply is provided.

The one I received for review had unfortunately upset the Post Office and they had subjected it to a high inertial shock. The upshot was that it rattled and the whole thing could be turned on and off by shaking it.

The power supply is fitted with "tamper proof" screws and so I did not tamper with it. There is also a conventional on/off switch if you are not lucky enough to have it modified by the Post Office.

The task of controlling six stepping motors simultaneously is not simple and so a very good demonstration program is provided. This allows you to drive each motor by pressing keys on the keyboard.

Once you have driven the arm to a particular point you can get the computer to remember it.

Having entered several points like this the computer can be made to move the arm through all the points in sequence.

Alternatively, you can step forwards or backwards through each point on command from the keyboard.

A point to note is that the arm will move directly from one point to the next in a straight line. Therefore you must set several points to move the arm over an object.

This is where the single stepping comes in – to allow you to intervene if you have programmed the arm to scythe through anything.

The torque of a stepping motor decreases as its speed increases. So if the arm is to lift anything heavy it needs to be slowed down.

However, while the arm is getting into position it is a bind to go so slowly. To this end the software allows you to select a different speed at each preset point.

Also, you can set a delay at each point so that the arm pauses before moving on to the next position.

The power required by the motors also varies depending upon the position of the arm.

I found the motors had to be slowed down slightly when the arm was at full stretch, even when it was carrying nothing.

The demonstration program is menu driven and fairly self explanatory. It can even display the arm's position in "absolute coordinates" which correspond to the number of steps the motor has received.

You can get a version of the arm with micro switches that detect the limit of travel on all six motors. This can prevent the arm being driven past its mechanical limits of movement.

The version I had did not have these on and although this might sound like a disadvantage it made very little difference in practice.

This was because I was always

→

Quinkey *Microwriter*

Six-year-olds soon felt quite at home on the Quinkey

Microwriter keyboard is handy on the Beeb

MICROWRITER, a small portable word processor with about 8k of memory, has been around for several years now. What made it unique, apart from portability, was its rather special keyboard which only has six keys.

The Microwriter keyboard itself – without the inbuilt memory – is now available for the BBC Micro as the Quinkey.

Strangely, the name suggests it has five keys (from the Latin *quinque*=five) though the name might have been more interesting if it had derived from the Latin for six *(sex)*!

Quinkey is housed in a good quality plastic moulding, about 9 x 4.5 x 2in in size. The six full travel keys have a positive though light feel and are arranged in a semi-circle so that the fingers of the right hand will rest above them. The thumb has two keys to control, while the other fingers control one key each.

Connection to the BBC is by a cable to the analogue port – where joysticks plug in. Up to four keyboards can be connected at the same time.

Before the micro can recognise the new keyboard a short piece of software (PROG) needs to be loaded and run. After this nearly every character and command can be entered directly from the Quinkey keyboard.

This linking software can be added to your own Basic programs. The manual contains notes on how this can be done easily.

To begin with I was rather sceptical. I had seen a demonstration before but it's difficult to believe that a keyboard with only six keys could replace the standard qwerty typewriter keyboard.

I doubted even more the claim that it would be easy to learn.

Well, after only a short time I had changed my mind. An hour or so is all it takes to learn all the alphanumeric and main control characters.

The manual supplied is clear. Simple diagrams show the keys to be selected and mnemonics are given to aid your memory. However putting in information quickly will obviously take more experience.

Interestingly the characters are selected, not when the keys are pressed, but when they are released. People find it easier to release keys together rather than pressing keys at the same time.

Also, because your fingers stay in the same position, you feel that you don't need to keep looking at the keyboard, which encourages touch typing.

Microwriter has also written some programs which make use of the keyboard such as Learn, which starts to give the basic ideas using the "shape a letter" system.

One of the best of these programs is Skram, a "zap" game. Here letters displayed on the screen must be selected within a time limit and more quickly than other players.

The keys pressed are displayed along with the correct combination if the answer is incorrect.

The graphics and sound combine to make this an entertaining way of learning to use the keyboard.

The Quinkey can be used as an alternative to the standard keyboard in word processing packages such as Wordwise and View. For example, this review was written with Wordwise via a Quinkey.

To allow for the numerous control codes in these programs a slightly different linking program called WP is supplied.

One drawback was that all the software was on tape. It would have been easier if it had been on disc. The best solution would be for the linking software to be in ROM, ready for use when required.

This is one piece of equipment that I'll be sorry to give back.

Jim Notman

From Page 117

watching the arm, and the extra strain caused the motor to stall, thus causing no damage at all.

I found using the arm both fascinating and fun. One of the first things I did was to program it to pick up a handkerchief, swivel round and drop it in my lap. Then placing my son (two years old) at the computer, the arm dutifully delivered it into his lap.

This caused great delight and he tried to give it back to the arm. Ever since he has periodically come up to it with one offering or another.

The use of this arm in a teaching situation would be very worth while, not only to teach about robotics, but also project planning.

The nature of robotics dictates a carefully planned approach. This makes the arm very suitable for group projects.

As well as fixed sequences it would be possible to program some "intelligence" into its operation.

When the result of writing a computer program is the controlling of objects it is very much more satisfying than words appearing on a screen.

This robot arm should be a great source of inspiration for the experimenter as well as being a valuable teaching aid.

Besides which it is great fun.

Mike Cook

Aries B20 RAM card
Cambridge Computer Consultants

Aries RAM card gives you room to stretch

ONE of the shortcomings of the BBC Micro has been its lack of user memory, although its total memory is no smaller than any other micro (including those advertised by elephants).

Acorn has decided to use the memory in the BBC Micro to give you a more powerful working environment which allows your programs to be shorter.

However in the higher resolution graphics modes you can easily run short, especially if you have large amounts of data to handle as well.

The principle of adding extra memory by the process of paging is not new – it has been used on the Apple computer for many years. It is even incorporated into the BBC Micro in those unique sideways ROM sockets.

Nevertheless, the trouble with a paged RAM system is that the software has to be aware that it is there.

The Aries RAM board gets round this limitation brilliantly and gives an extra 20k of RAM. It does this by switching a piece of sideways RAM that lies over the same address as the RAM used for the display.

This is normally switched in, so the extra board is used to store our program. However whenever a VDU command is executed the board automatically switches out and accesses the display memory.

The practical result is that you can use any graphics mode and still have the same amount of memory. This means you have an extra 1k if you are using Mode 7 or an extra 20k if you are using Modes 0 to 3.

Therefore when you are writing programs you don't have to compromise on complexity in order to use a high resolution mode.

The fact that this switching is done totally automatically makes it transparent to any software you use. So it will work with any software "correctly written". By that I mean software that uses the correct operating system calls.

However some programs, usually games, access the memory directly to allow fast animation. These will not work while the Aries board is operational so it can be turned off from the keyboard.

The commands *XOFF and *XON allow it to be switched. As the board takes up a few extra bytes of memory when you turn it off it will prompt you to press the break key to recover these bytes.

In fact I found that the Break key had to be pressed to complete the turning off process. Therefore you can't load a program, turn off the board and then recover the program with the OLD command.

This was a minor irritation, as I found I remembered I needed to switch the board off just after I had loaded the program in.

The hardware consists of a plug-in board and a sideways ROM. You remove the microprocessor chip and plug it into the board. The board then plugs into the empty microprocessor socket.

The whole board is supported by fine-turned pillars that plug into the vacated socket and are of such a design that they can be easily removed without doing any damage to it.

The whole thing resembles a North Sea oil platform. Add the ROM to any socket and you are ready to switch on.

When you do you will be greeted by the message "BBC Computer 52K." This tells you the board is in operation. A *HELP will also inform you of its presence.

The board is not mechanically compatible with the APTL sideways ROM board as both span the same part of the board.

Cambridge Computer Consultants is planning to bring out its own sideways ROM board for those who need that function.

The switching between the two planes of RAM inevitably takes some time, so I set out to find out how much the operation of the board slowed down a graphics program.

To do this I modified the Pattern program on the Welcome tape to always produce the same pattern and then I ran it with and without the board in operation.

The program appeared to be just as fast, so I made the internal clock time them. Without the board it took 13.16 seconds and with the board it took 13.33 seconds. Therefore it took 0.17 seconds extra – just under 1.3 per cent longer.

This program has a higher than average number of screen accesses and being just 0.17 seconds longer in over 13 seconds does not worry me. In fact I can't think of a situation where it would be a problem.

If you want to use Mode 7, for example, you then have 19k of memory doing nothing. This can be used for storing data by use of the indirection operators.

The two planes of memory can be switched using a *FX call. The instruction manual explains how to do this and I can confirm that it works.

The great thing about this system is that the software does not have to know it is there. Therefore you can have an 80 column display when using VIEW and still have the full amount of memory.

However I found that Wordwise would not work with the board switched on. This must be because it directly accesses the memory instead of using the VDU calls.

The only other incompatibility was in programs that used a *SAVE to store a screen display on disc. These must be modified to swap the memory just before and after the SAVE, or they can be run with the board off.

Who would benefit from this board? Just about anybody who has ever come across the "No room" or "Bad mode" error messages.

If you are a programmer the extra space gives you room to stretch. If you are using a compatible word processor you can see the text as it will be printed and still have the maximum amount of memory to store your text.

At the price the Aries board is well worth it and is something that has become a permanent feature on my machine.

Mike Cook

SCREENPLAY

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SCREENPLAY offers anyone who buys the ANIMATOR for the DRAGON 32/64 or the BBC Micro, the chance to recover the cost and a whole lot more.

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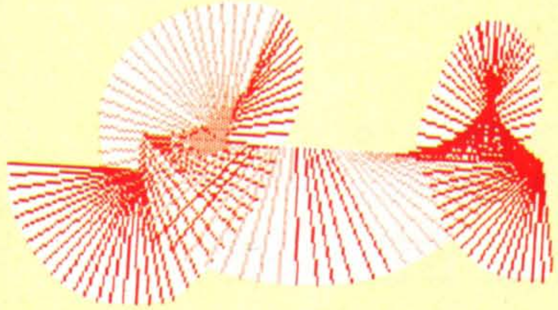


Try freewheeling with SPOKES

SPOKES is a program which draws a multicoloured pattern like the spokes of a wheel.

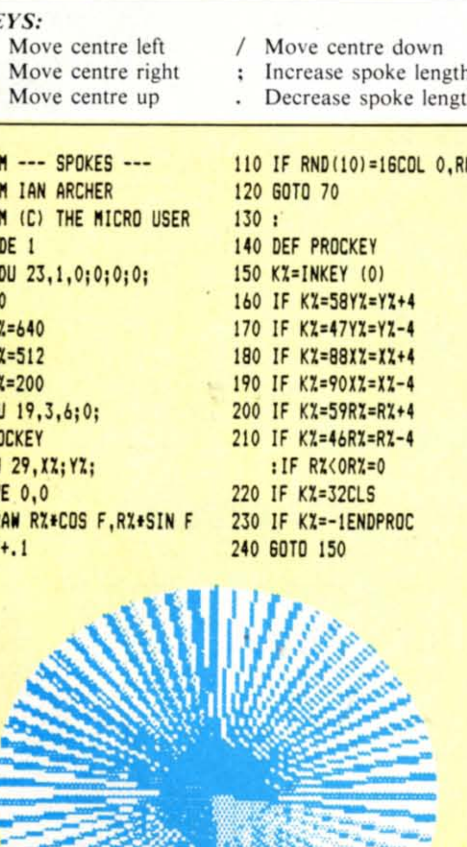
And you aren't stuck with just the one pattern. You can use the keyboard to move it around the screen. It's a fascinating and beautiful demonstration of the Beeb's graphics abilities.

KEYS:

Z	Move centre left	/	Move centre down
X	Move centre right	;	Increase spoke length
:	Move centre up	.	Decrease spoke length

```
10 REM --- SPOKES ---
20 REM IAN ARCHER
30 REM (C) THE MICRO USER
40 MODE 1
   :VDU 23,1,0;0;0;0;
50 F=0
   :X%=640
   :Y%=512
   :R%=200
60 VDU 19,3,6;0;
70 PROCKEY
80 VDU 29,X%;Y%;
90 MOVE 0,0
   :DRAW R%*COS F,R%*SIN F
100 F=F+.1
```

```
110 IF RND(10)=1GCOL 0,RND(3)
120 GOTO 70
130 :
140 DEF PROCKEY
150 K%=INKEY (0)
160 IF K%=58Y%=Y%+4
170 IF K%=47Y%=Y%-4
180 IF K%=88X%=X%+4
190 IF K%=90X%=X%-4
200 IF K%=59R%=R%+4
210 IF K%=46R%=R%-4
    :IF R%<0R%=0
220 IF K%=32CLS
230 IF K%=-1ENDPROC
240 GOTO 150
```



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ANDREW GOLDSWORTHY finds a subliminal solution to teaching spelling

SPELL WELL – IN A FLASH

THE problem was brought home to me – literally – by my young daughters. Every week they are given lists of words by their school teachers and told to learn to spell them. They then demand that I test them repeatedly until they are word perfect.

This seemed an obvious job for the computer, which has more patience than the average mortal. Unfortunately the problem of teaching spelling seemed pretty intractable.

In order to test someone on spelling, you must tell him (or her) what to spell without telling him how, and since most small computers communicate mainly in writing, this presents an obvious problem.

Various solutions have been tried, such as using graphics to draw a picture or to use a voice synthesiser. In either case writing the program for each new word is so time consuming as to be simply not worthwhile.

The program I have written is a new and simple way to solve this problem.

It is based on subliminal or near-subliminal prompting and, as far as I know the idea is original.

The words to be learned are drawn in sequence from the user's own list of data and flashed on the screen for long enough for the child to recognise them, but not for so long that he can take in their spelling.

He is then asked to type in the word. If his spelling corresponds to that in the data he is allowed to proceed to the next.

The program is slightly more complicated in that it is designed to cope with several children of differing spelling abilities. When they type in their name, the computer selects the appropriate list.

A similar system could be used in schools to teach a whole class of children. But if the numbers are large it might be more convenient to type in their "spelling grade", say A, B or C, instead.

The score of correct and incorrect answers is given at the end of the sequence. Or it can be obtained at any time by typing in S in place of the word.

Line 10 disables the keyboard auto-repeat. Inexperienced young "typists" find this facility a bit disconcerting when they are trying to concentrate on their spelling.

Also unwanted characters in the keyboard buffer can cause problems with a program controlled by GET$.

Lines 20 to 140 give the instructions and ask for the user's name (or grade).

Lines 150, 160 and 170 operate in conjunction with the data lines so that one of three spelling lists may be selected according to the child's name.

If an unrecognised name is typed in, the system defaults to the first list.

The user can type in his own lists of data on *lines 400 to 409, 410 to 419 and 420 onwards respectively.*

The words should be separated by commas, but no spaces. The last item should be the letter Z to indicate the end of the sequence.

When the child's name has been entered there is a short delay *(lines 210 and 220),* after which the word in *A$* is flashed on to the screen.

The duration of the flash is determined by the length of the FOR NEXT loop on *line 250.*

The value 500 was selected by trial and error using my own children as guinea pigs, but this could be varied to cope with children of different abilities.

If he missed it the first time, the flash can be repeated by hitting Return *(line 290)* without affecting the score.

Line 310 compares the child's input with the authentic word. If they match the computer prints "correct" and the child is rewarded by a short musical sequence.

For use in a classroom it might be best to delete the three SOUND statements on this line.

If the answer is incorrect *line 320* allows the same word to be repeated until a correct answer is obtained.

Lines 330 to 390 are concerned with displaying the score and returning the child to the earlier parts of the program so that he can repeat, or continue, with the sequence he was doing, or change the sequence.

```
 1 REM A SPELLING TEST
 2 REM
 3 REM by ANDREW GOLDSWORTHY
 4 REM
 5 REM For use in schools or
 6 REM at home to help children
 7 REM learn to spell with the
 8 REM user's own word-lists.
 9 REM (c) Micro User 1984
10 *FX11,0
20 CLS
30 PRINT "I will make a word"
40 PRINT "Flash upon the screen"
50 PRINT "Then I'll ask you spell
    it"
60 PRINT "As soon as it's been
    seen"
70 PRINT
   :PRINT
80 PRINT "(hit 'return' for another
    look)"
```

Spell listing

From Page 125

```
 90 PRINT "('S' and 'return' gives
     the score)"
    :PRINT
    :PRINT
    :PRINT
    :PRINT
100 RESTORE 400
110 PRINT
    :PRINT
120 PRINT "TYPE IN YOUR NAME OR
     GRADE AND HIT"
130 PRINT "'RETURN'"
140 PRINT
    : INPUT TAB(8)NAME$
150 IF NAME$="A" OR NAME$="ALICE"
    THEN RESTORE 400
160 IF NAME$="B" OR NAME$="CATHERINE
    "
    THEN RESTORE 410
170 IF NAME$="C" OR NAME$="MARY"
     OR NAME$="=MATTHEW"
    THEN RESTORE 420
180 C=0
    :W=0
190 READ A$
200 T=TIME
210 IF TIME <T+180
    THEN GOTO 210
220 IF A$="Z"
    THEN GOTO 330
230 CLS
240 PRINT TAB(15,10) A$
250 FOR X=1 TO 500
    :NEXT X
260 CLS
270 PRINT TAB(5,18)"SPELL THE WORD
     AND PRESS RETURN"
280 PRINT
    :INPUT TAB(15)B$
290 IF B$=""
    THEN CLS
    : GOTO 200
300 IF B$="S"
    THEN GOTO 330
310 IF B$=A$
    THEN PRINT TAB(17)"CORRECT"
    :C=C+1
    :SOUND 1,-15,50,10
    :SOUND 1,-15,66,10
    :SOUND 1,-15,78,10
    :GOTO 190
320 PRINT TAB(17)"TRY AGAIN"
    :W=W+1
    :GOTO 200
330 CLS
    :PRINT TAB(8,10)"SCORE CORRECT=
     ";C
    :PRINT TAB(8,12)"SCORE INCORRECT
    = ";W
340 PRINT TAB(8,16)"HIT 'R' TO REPEA
    T OR CONTINUE"
350 PRINT TAB(8,18)"HIT 'C' TO CHANG
    E GRADE"
360 G$=GET$
370 IF G$="R"
    THEN GOTO 150
380 IF G$="C"
    THEN GOTO 100
390 GOTO 360
400 DATA BOBBING,ACTIVITIES,ELIZABET
    H,MATTHEW,CONCERT,MUDDLE,FIREWOR
    KS,TIPPING,Z
410 DATA CAT,FILL,DOG,Z
420 DATA FISH,FIND,TWO,Z
```

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"MANAGER OF THE MONTH"

COMPETITION

We guess that most of our users are, like ourselves, disappointed that they won't be watching any of the home countries' teams in the European Nations' Cup. So, to take us through the summer, we are running our own "MANAGER OF THE MONTH" competition for June, July and August. That's 3 prizes of £100 each for the best managerial performance to be submitted to us during those months. The rules are very simple. We believe that the recently announced REV.1 of the program is an accurate measure of your ability as a soccer manager. We are looking for the best 5 season performance (one game) to be played in that month. You submit your best game, played at any level, on the official entry form supplied with all copies of "League Division One REV.1". A full description of the rules appear on that form; they merely ensure no "cheating", that you are a genuine owner of the program, and that no-one connected with QUAL-SOFT takes part. You can submit only one entry each month, but can enter in each of the 3 months (except for the winner).

Current owners of the game will understand the competition, but for newcomers here is a brief account of the game. The program realistically simulates the problems of the manager of a club newly promoted to the 1st Division of the Football League. You have a squad of 18 players and a further 12 players available on the transfer market. Your job is to build up a squad which, over the next 5 seasons, will challenge for the 1st Division Championship. The game will test your knowledge of the real game of soccer to the full, and your ability to use that knowledge intelligently. This doesn't mean that you have to be a genius to play well, our best performance to date (that we know of) has been from a 13 year old, but you do need to think hard about your tactics and strategy.

For a more detailed description look back over the last 6 issues of The Micro User.

A WORD ON MAIL ORDER. Many people are, justifiably, concerned about mail order. Delivery can be bad, even non-existent; no-one to contact in the case of problems, letters go unanswered; worst of all the programs are often amateurish or just plain "junk". Right? Doubtless you have other complaints.

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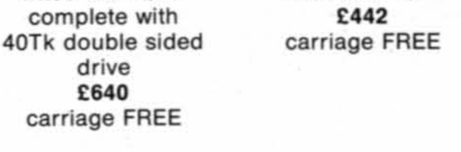

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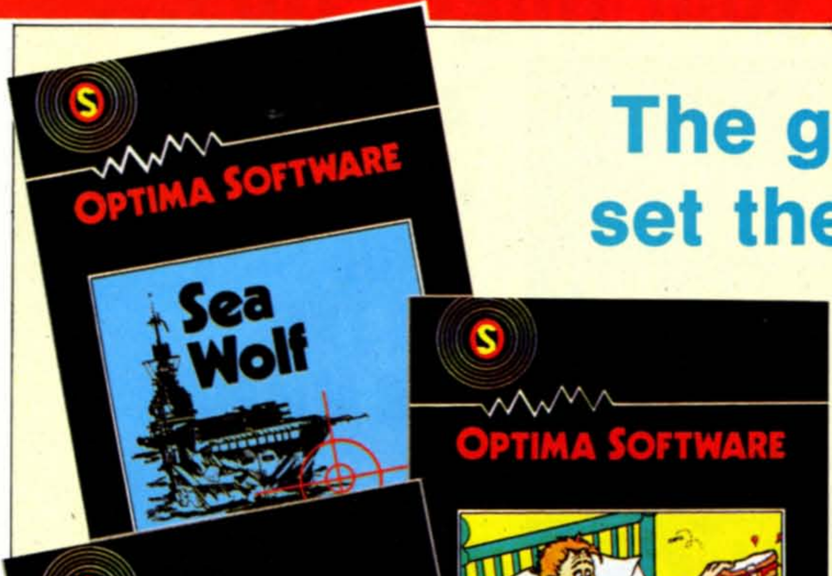

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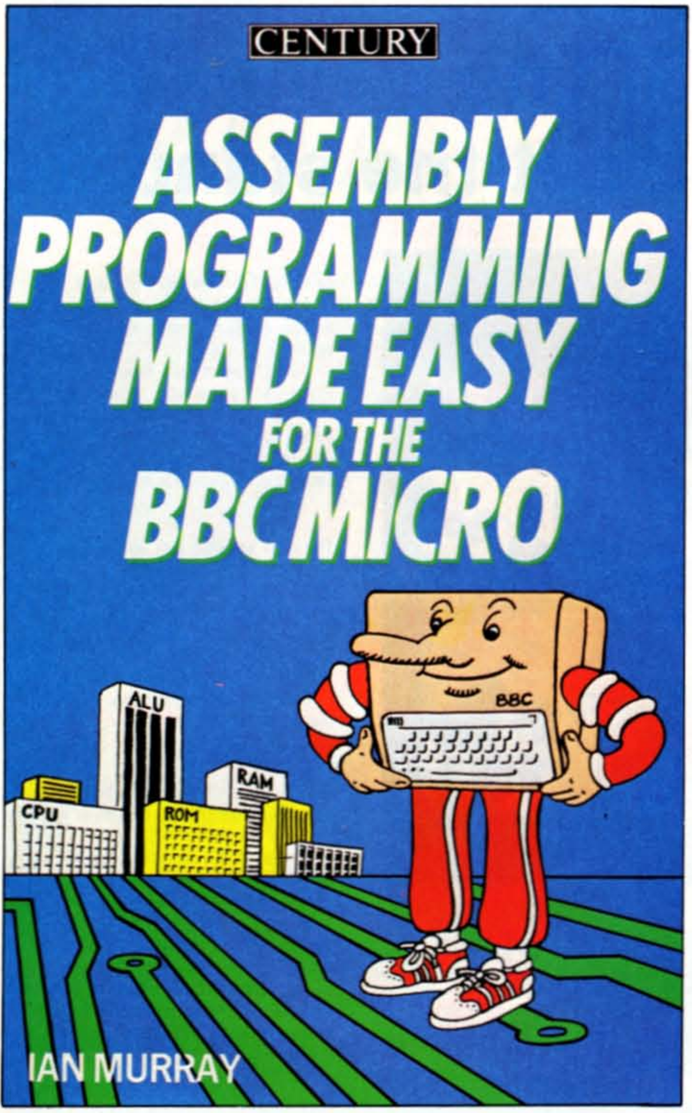

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Road Racer listing

From Page 83

```
    :ENDPROC
390 DEF PROCsetup1
400 GO=1
    :TI=0
    :score1%=0
    :score%=0
    :del%=120
410 VDU 19,0,4;0;19,1,2;0;19,2
    ,2;0;19,3,0;0;19,4,0;0;19,5
    ,2;0;19,8,2;0;19,9,1;0;19,10
    ,2;0;
    :CG=13
420 CO1%=0
    :CO2%=2
    :MCP%=-80
430 CM1%=0
    :CM2%=0
    :CM3%=0
440 MC1%=2
    :MC2%=2
    :MC3%=2
450 ENDPROC
460 DEF PROCroad
470 VDU 29,0;0;
480 GCOL 0,10
    :MOVE 200,550
    :DRAW 640,550
    :PLOT 85,800,520
490 GCOL 0,8
    :MOVE 0,550
    :DRAW 350,600
    :PLOT 85,610,500
    :MOVE 1280,550
    :DRAW 670,500
    :PLOT 85,990,620
500 GCOL 0,5
    :MOVE 0,0
    :DRAW 200,0
    :PLOT 85,0,553
    :PLOT 85,610,500
    :MOVE 670,500
    :DRAW 1280,550
    :PLOT 85,1080,0
    :PLOT 85,1280,0
510 GCOL 0,4
    :MOVE 0,553
    :DRAW 610,500
    :MOVE 670,500
    :DRAW 1280,550
520 DEF PROCroad1
530 VDU 29,0;0;
    :GCOL 0,0
    :MOVE 200,0
    :DRAW 610,500
    :PLOT 85,1080,0
    :DRAW 670,500
    :PLOT 85,200,0
    :MOVE 610,500
    :DRAW 670,500
    :PLOT 85,640,0
    :VDU 29,640;512;
    :ENDPROC
540 ENDPROC
550 DEF PROCtele_pole
560 FOR P=1TO 3
    :GCOL 0,P
570 IF P=1
    THEN X=89
    :Y=11
    ELSE IF P=2
    THEN X=81
    :Y=9
    ELSE IF P=3
    THEN X=73
    :Y=7.5
580 PROCdraw1
590 NEXT
600 ENDPROC
610 DEF PROCdraw1
620 FOR I=1TO 11
630 VDU 29,640;512;
    :MOVE 0,0
    :MOVE -X,-Y
    :DRAW -X,-Y-Y
    :MOVE -X+(Y/5),-Y-(Y/8)
    :DRAW -X-(Y/5),-Y-(Y/8)
    :MOVE X,-Y-Y
    :DRAW X,-Y
    :MOVE X+(Y/5),-Y-(Y/8)
    :DRAW X-(Y/5),-Y-(Y/8)
640 X=X*1.37
    :Y=Y*1.7
    :NEXT
650 ENDPROC
660 DEF PROCmove
670 REPEAT
    :FOR I%=3TO 1STEP -1
680 J%=I%+1
    :IF J%=4
    THEN J%=1
690 VDU 19,I%,CO1%;0;19,J%,CO2%;0;
700 GR$=INKEY$ (0)
710 IF GR$="M"
    THEN GY=1
    ELSE IF GY=0
    THEN 700
720 PROCmovecar
730 PROCcar
740 IF GR$=" "
    THEN GY=0
750 PROCdelay
760 NEXT
770 PROCscore
780 IF TI>58AND scene%=1
    THEN VDU 19,10,1;0;
    ELSE IF TI>58AND scene%=2
    THEN VDU 19,10,2;0;
    ELSE IF TI>58AND scene%=3
    THEN VDU 19,0,0;0;
    ELSE IF TI>58AND scene%=4
    THEN VDU 19,10,7;0;
    :VDU 19,0,4;0;
790 IF TI>59AND scene%=1
    THEN VDU 19,8,1;0;
    ELSE IF TI>59AND scene%=2
    THEN VDU 19,8,2;0;
    ELSE IF TI>59AND scene%=4
    THEN VDU 19,8,7;0;
800 UNTIL TI>60
810 IF scene%=1
    THEN CO1%=1
    :CO2%=1
    :VDU 19,5,1;0;
    ELSE IF scene%=2
    THEN CO1%=0
    :CO2%=2
    :VDU 19,5,2;0;
    ELSE IF scene%=4
    THEN CO1%=0
    :CO2%=7
    :VDU 19,5,7;0;
820 del%=del%-5
    :IF del%<=100
    THEN del%=100
830 score%=score%+TI
840 TI=0
850 ENDPROC
860 DEF PROCmovecar
870 SOUND 1,1,5,4
880 VDU 5
    :GCOL 0,0
    :MOVE MCP%,-412
    :PRINT PC$
890 IF MCP%<=-250
    THEN MCP%=-300
    ELSE IF MCP%>=86
    THEN MCP%=120
900 IF POINT(MCP%+20,-412)=9
    OR POINT(MCP%+160,-412)=9
    THEN PROCcrash
910 IF POINT(MCP%+50,-412)=9
    OR POINT(MCP%+130,-412)=9
    THEN PROCcrash
920 IF GR$="."
    THEN MCP%=MCP%+100
    ELSE IF GR$=","
    THEN MCP%=MCP%-100
```

→

Road Racer listing

From Page 131

```
 930 GCOL 0,6
     :COLOUR 6
     :MOVE MCP%,-412
     :PRINT PC$
     :VDU 4
     :ENDPROC
 940 DEF PROCcar
 950 CHC=RND(6)
     :IF CHC=1OR CM1%=1
     THEN PROCcar1
 960 IF CHC=3OR CM2%=3
     THEN PROCcar2
 970 IF CHC=3OR CM3%=5
     THEN PROCcar3
 980 ENDPROC
 990 DEF PROCcar1
1000 CM1%=1
1010 VDU 5
     :GCOL 0,0
     :MOVE CX1%(MC1%-1),CY1%(MC1%-1)
     :PRINT CN1$(MC1%-1)
1020 IF MC1%=15
     THEN CM1%=0
     :MC1%=2
     :ENDPROC
1030 GCOL 0,9
     :MOVE CX1%(MC1%),CY1%(MC1%)
     :PRINT CN1$(MC1%)
     :VDU 4
1040 MC1%=MC1%+1
1050 ENDPROC
1060 DEF PROCcar2
1070 CM2%=3
1080 VDU 5
     :GCOL 0,0
     :MOVE CX2%(MC2%-1),CY2%(MC2%-1)
     :PRINT CN2$(MC2%-1)
1090 IF MC2%=13
     THEN CM2%=0
     :MC2%=2
     :ENDPROC
1100 GCOL 0,9
     :MOVE CX2%(MC2%),CY2%(MC2%)
     :PRINT CN2$(MC2%)
     :VDU 4
1110 MC2%=MC2%+1
1120 ENDPROC
1130 DEF PROCcar3
1140 CM3%=5
1150 VDU 5
     :GCOL 0,0
     :MOVE CX3%(MC3%-2),CY3%(MC3%-2)
     :PRINT CN3$(MC3%-2)
1160 IF MC3%=19
     THEN CM3%=0
     :MC3%=2
     :ENDPROC
1170 GCOL 0,9
     :MOVE CX3%(MC3%),CY3%(MC3%)
     :PRINT CN3$(MC3%)
     :VDU 4
1180 MC3%=MC3%+1
1190 ENDPROC
1200 DEF PROCcrash
1210 SOUND 0,-10,5,10
1220 count=0
1230 FOR count=1TO 40
1240 count=count+1
1250 MOVE MCP%+80,-412
1260 A=RND(80)
     :B=RND(100)+350
1270 GCOL 0,RND(4)+5
1280 DRAW A,-B
     :MOVE MCP%+80,-420
     :DRAW -A,-B
1290 NEXT count
1300 GY=0
1310 IF GO=3
     THEN PROCend
1320 GO=GO+1
1330 PROCroad1
1340 MCP=-80
     :MC1=2
     :MC2=2
     :MC3=2
1350 ENDPROC
1360 DEF PROCend
1370 VDU 29,0;0;
     :CLS
     :VDU 4
1380 score%=score%+TI*10
     :COLOUR 9
     :PRINT TAB(4,1);"ROAD RACER"
1390 PRINT TAB(4,2);"----------"
1400 COLOUR 4
1410 PRINT
     :PRINT "You scored ";score1%*10
1411 *FX15,1
1420 IF score1%*10>Hi
     THEN PRINT "ENTER NAME";
     :INPUT NAME$
     :Hi=score1%*10
     :H%=Hi
1430 PRINT
     :PRINT "HI-SCORE:"
     :PRINT
     :PRINT TAB(0);Hi;":";NAME$
1440 PROCsetup1
1450 PRINT TAB(3,13)"ANOTHER GAME";
     :INPUT AG$
     :IF AG$="Y"
     THEN 35
     ELSE IF AG$="N"
     THEN END
     ELSE GOTO 1450
1460 DEF PROCdelay
     :FOR del=1TO del%
     :NEXT
     :ENDPROC
1470 DEF PROCscore
     :TI=TI+1
     :score1%=TI+score%
     :VDU 4
     :PRINT TAB(1,1);"SCORE: ";score1
     %*10"   "
     :ENDPROC
1480 DATA 255,255,24,60,126,126
     ,129,0,7,3,0,61,61,61,61,61
     ,224,192,0,188,188,188,188
     ,188,0,0,0,0,60,219,255,195
     ,0,7,4,31,17,17,17,31,24,231
     ,66,66,129,129,255,0
1490 DATA 0,224,32,248,136,136,136
     ,248,0,0,255,255,24,60,255
     ,0,0,0,0,0,0,224,224,224,0
     ,0,0,0,0,7,7,7
1500 DATA -35,-50,-70,-100,-200
     ,-390,-50,-60,-70,-100,-230
     ,-350
1510 DATA -35,-50,-70,-100,-200
     ,-390,20,30,35,35,30,110
1520 DATA -35,-50,-70,-100,-200
     ,-390,-10,-10,-10,-25,-70,-80
1530 DEF PROCinstruction
1540 CLS
     :COLOUR 2
     :PRINT TAB(15,1);"ROAD RACER"
1550 PRINT TAB(15,2);"----------"
1560 COLOUR 1
     :PRINT
     :PRINT
     :PRINT "     The object of the
      game is to dodge  the cars
      for as long as you can. The
        scenes change four times."
1570 PRINT
     :PRINT "    The directions are
      as follows:"
1580 PRINT
     :PRINT "                <...LEFT"
1590 PRINT "                >...RIGHT"
1600 PRINT "                M...START"
1610 PRINT "              SPC...STOP"
1620 PRINT TAB(7,20)"PRESS A KEY
      TO PLAY";
     :A=GET
1630 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 165.

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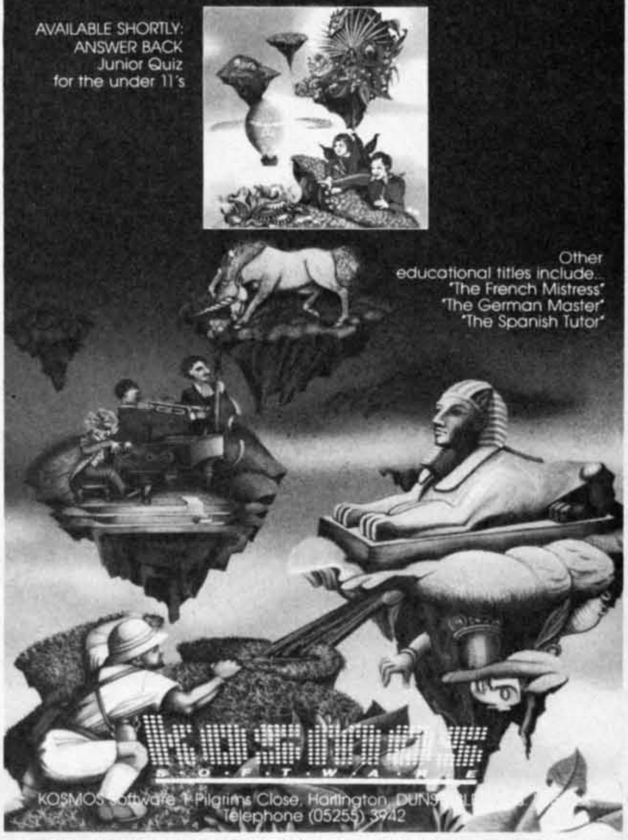

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Synchronises a
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UTILITY

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Drive yourself mad around this maze adventure. You will have to stay pretty cool to avoid trouble, cope with a myriad of hazards, not to mention a bolshy mate, and get your deliveries right, all at the same time. The Law is never far behind . . . so watch out!
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An original card based game of great subtlety. The idea is to place 25 of your 26 cards in positions which equal or are greater than the value of the computer's cards. Excellent graphics include clues about the suits and values of the computer's hidden hand – you must be very shrewd to win the maximum 40 tricks. Keyboard.

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A suite of programs comprising
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This is a powerful utility which gives the serious user easy domination over the BBC's extensive Mode 7 capabilities, Comprehensive manual.

SLIDER £8.50

This utility synchronises a single slide film projector with a pre-recorded tape commentary or music background. A slide projector with remote control is required. Programs allows up to 999 slides to be controlled for variable display times. Applications for lecturers, photographers, architects etc. and micro film users. Instruction manual.

LIGHT CYCLES £7.50

A fast reaction game for the fleet of hand and mind. Can you surround the enemy with your light trace and make them crash? The better you are, the more cunning and numerous the enemy become. Simple and infuriating. Full scoreboard and sound. Keyboard.

MORSE INSTRUCTOR £5.95

This program teaches the Morse Code; Character to Morse, Morse to Character. Random character group sequences and 36 word passages provided at a choice of 8 speeds. Limited facilities to simulate transmission using the keyboard.

SHIP LIGHTS GUIDE £5.95

Recognition of ships' lights from three aspects, ahead, abeam, astern. A program designed to assist users in fast identification in conformity with the International Collision Regulations and to test knowledge at a primary or advanced level.

ALL PRICES ARE FULLY INCLUSIVE

We always require good programs on general or specialist subjects for the BBC or Electron.

EBUG £8.50

This utility allows examination of any area of the BBC's memory or any disc sector. Step, Move, Zero, Transfer, Alter, Read/Write to discs, Printout, Display, etc. A simple and excellent debugging program with full instructions.

EUROPE £5.95

Detailed map of Europe with 9 sections of 25 questions each covering Capitals, Countries, Rivers, Seas, Populations, EEC & Warsaw Pact Countries at 2 levels. Ability to plot and calculate distances between any two points. Suitable for 8-15 year olds.

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Hardware and Software for the BBC Micro. Just a few of our Business, Domestic & Educational Programs available on cassette or disc.

107 MEMO—CALC £12.95 + VAT B C/D

"It must be among the least expensive pieces of useful software you will ever buy" Revue by Practical Computing July 1983.

This is a database/calcsheet program which is allows up to 255 columns. The number of rows is automatically set from 5 to over 1000 depending on the columns declared. Both numeric and alphameric data can be stored in any cell and can be of any length up to 255 characters.

106 PAYROLL (W or M) £24.95 each + VAT B C/D

Two part programs to handle the wages on a weekly or separately on a monthly basis for up to 100 employees in memory at the same time. Order as WEEKLY or MONTHLY. Deduct £5.00 if both weekly & monthly programs purchased at same time. A PAYROLL update service is offered at £6.00 per annum + VAT

304 STATPACK £9.95 + VAT B C/D

A statistic package written by Micro-Aid that first appeared in the Personal Computer World magazine between autumn of 1978 and the Spring of 1979 as a series of articles.
This fascinating suite of modules will appeal to Schools, Colleges and businesses alike proving extremely valuable.

102 CASHBOOK £11.95 + VAT B C/D

FIRST CHOICE. This is a double entry cashbook program showing cash and bank credits and debits, i.e. 4 columns. Any number of individual accounts can be used and analysed or totalled individually or cumulatively by associated group.

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Micro-Aid

**25 Fore Street, Praze, Camborne,
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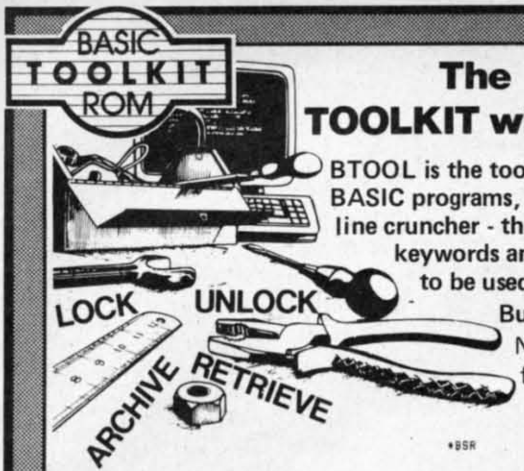
Quadline listing

From Page 55

```
580 VDU 31,X%,Y%
590 LOCAL a%,b%,c%,d%,X%,Y%,A%
600 FOR a%=1TO LEN A$
610 ?data=ASC (MID$(A$,a%,1))
620 X%=data MOD 256
    :Y%=data DIV 256
    :A%=10
    :CALL &FFF1
630 FOR b%=0TO 1
640 VDU 23,b%+130
650 FOR c%=0TO 3
    :FOR d%=0TO 1
660 VDU data?(c%+b%*4+1)
670 NEXT
    :NEXT
    :NEXT
680 VDU 130,10,8,131,11
690 NEXT
700 IF Z%<2OR A$="THINKING"SOUND 1
    ,1,RND(20)+200,12
710 ENDPROC
720 DEF PROCprintboard
730 LOCAL X%,Y%
740 COLOUR 129
    :CLS
750 COLOUR 2
    :PROCbig("Me: "+STR$ me%,0
    ,25)
760 PROCbig("Counters: 21",7,25)
770 COLOUR 3
    :PROCbig("You: "+STR$ you%
    ,0,28)
780 PROCbig("Counters: 21",7,28)
790 VDU 28,2,19,18,2
    :COLOUR 133
    :CLS
800 VDU 28,3,18,17,3
    :COLOUR 128
    :CLS
810 COLOUR 1
820 FOR X%=1TO 7
    :FOR Y%=0TO 6
830 IF Y%PRINT TAB(X%*2-1,Y%*2)
    CHR$ 128
    :B%(X%,Y%)=0
    :Y%(X%)=0
    :
    ELSE B%(X%,Y%)=1
840 NEXT
    :NEXT
850 counters=42
860 ENDPROC
870 DEF PROCinkey
880 LOCAL LX%,OX%,T%,FLAG
    :FLAG=FALSE
890 VDU 5
900 LX%=256
    :OX%=LX%
910 GCOL 3,4
    :MOVE LX%,486
    :VDU 129
920 REPEAT
930 REPEAT
940 IF INKEY (-103)AND LX%>256LX%=LX
    %-128
950 IF INKEY (-104)AND LX%<1024LX%=L
    X%+128
960 MOVE OX%,486
    :VDU 129
970 MOVE LX%,486
    :VDU 129
980 IF OX%<>LX%SOUND 0,1,1,4
990 PROCdelay(2)
1000 OX%=LX%
1010 UNTIL INKEY (-99)
1020 IX%=(LX%-256)DIV 128+1
1030 IF Y%(IX%)<6 Y%(IX%)=Y%(IX%)+1
    :FLAG=TRUE
    :
    ELSE SOUND 0,-15,2,25
1040 UNTIL FLAG
1050 MOVE LX%,486
    :VDU 129
1060 B%(IX%,Y%(IX%))=5
1070 VDU 4
1080 PROCprintcounter(IX%)
1090 PROCprintcountersleft(3)
1100 ENDPROC
1110 DEF PROCcheckwin(C%)
1120 IF C%=-1
    :REPEAT CO%=RND(7)
    :UNTIL B%(CO%,6)=0
    :Y%(CO%)=Y%(CO%)+1
    :B%(CO%,Y%(CO%))=1
    :COLOUR 3
    :PROCprintcounter(CO%)
    :FLAG=TRUE
    :ENDPROC
1130 FLAG=FALSE
1140 PROCshuffle(4,6)
1150 FOR Y%=1TO 6
1160 FOR X%=1TO 4
1170 D%=B%(X2%(X%),Y2%(Y%))+B%(X2%(X%
    )+1,Y2%(Y%))+B%(X2%(X%)+2,Y2%(Y%
    ))+B%(X2%(X%)+3,Y2%(Y%))
    :IF D%=C% PROCvalid(X2%(X%)
    ,Y2%(Y%),X2%(X%)+1,Y2%(Y%)
    ,X2%(X%)+2,Y2%(Y%),X2%(X%)+3
    ,Y2%(Y%),C%)
1180 NEXT
    :NEXT
1190 IF FLAG ENDPROC
1200 PROCshuffle(4,3)
1210 FOR X%=1TO 4
1220 FOR Y%=1TO 3
1230 D%=B%(X2%(X%),Y2%(Y%))+B%(X2%(X%
    )+1,Y2%(Y%)+1)+B%(X2%(X%)+2
    ,Y2%(Y%)+2)+B%(X2%(X%)+3,Y2%(Y%)
    +3)
    :IF D%=C% PROCvalid(X2%(X%)
    ,Y2%(Y%),X2%(X%)+1,Y2%(Y%)+1
    ,X2%(X%)+2,Y2%(Y%)+2,X2%(X%)+3
    ,Y2%(Y%)+3,C%)
1240 IF FLAG=0 D%=B%(X2%(X%)+3,Y2%(Y%
    ))+B%(X2%(X%)+2,Y2%(Y%)+1)+B%(X2
    %(X%)+1,Y2%(Y%)+2)+B%(X2%(X%)
    ,Y2%(Y%)+3)
    :IF D%=C% PROCvalid(X2%(X%)+3
    ,Y2%(Y%),X2%(X%)+2,Y2%(Y%)+1
    ,X2%(X%)+1,Y2%(Y%)+2,X2%(X%)
    ,Y2%(Y%)+3,C%)
1250 NEXT
    :NEXT
1260 IF FLAG OR C%=10 ENDPROC
1270 PROCshuffle(7,3)
1280 FOR X%=1TO 7
1290 FOR Y%=1TO 3
1300 D%=B%(X2%(X%),Y2%(Y%))+B%(X2%(X%
    ),Y2%(Y%)+1)+B%(X2%(X%),Y2%(Y%)+
    2)+B%(X2%(X%),Y2%(Y%)+3)
    :IF D%=C% PROCvalid(X2%(X%)
    ,Y2%(Y%),X2%(X%),Y2%(Y%)+1
    ,X2%(X%),Y2%(Y%)+2,X2%(X%)
    ,Y2%(Y%)+3,C%)
1310 NEXT
    :NEXT
1320 ENDPROC
1330 DEF PROCmygo
1340 PROCcheckwin(4)
1350 IF FLAG ENDPROC
1360 PROCcheckwin(20)
1370 IF FLAG ENDPROC
1380 COLOUR 13
    :PROCbig("THINKING",3,0)
1390 PROCcheckwin(3)
1400 IF FLAG ENDPROC
1410 PROCcheckwin(15)
1420 IF FLAG ENDPROC
1430 IF level=49 PROCcheckwin(-1)
    :ENDPROC
1440 PROCcheckwin(2)
1450 IF FLAG ENDPROC
1460 PROCcheckwin(10)
1470 IF FLAG ENDPROC
```

→



The TOOLKIT with CRUNCH

BTOOL is the toolkit to assist in writing your BASIC programs, because it contains its own line cruncher - thus enabling BASIC keywords and part keywords to be used in *BFIND and *BSR.

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Now you can add the following commands to your series 1 Operating System.

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. . . . together with *HELP and password protection (requires a password to be entered on power up).

Note: password (if required) may include up to ten alpha numeric characters.

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Further details available from DATAWARE

SPELLWISE

The spelin cheka forr the BBC mikro and Werdwyse.

SPELLWISE is a machine code spelling checker with a 6000 word dictionary (3000 on tape) which can be expanded to include your own specialist vocabulary.

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NEW LOW SUMMER PRICES EACH TAPE ONLY £5.95

DESIGN (B)(E) "NEW VERSION"
If you enjoy the idea of creating your own user defined characters but are put off by the time consuming mathematics, then DESIGN is for you! DESIGN lets your imagination loose by letting you draw your characters, in all 16 colours, on an 8 × 8 grid leaving all the hard work to the machine. DESIGN's features include being able to recall multiple characters for re-editing and displaying VDU 23 commands. All characters used in KAY-ESS programs are created using DESIGN.

SPACE TRAFFIC CONTROLLER – "NEW" (B)(E)
As a space traffic controller you have been stationed at the main robot cargo port of the planet Ore-7. It is your job to get the robot spacecrafts down in one piece. As your confidence increases you can increase the number of crafts allowed withing your control area. Warning: not to be played after a hard or hectic day!

SPACE TANK (B)
After your SPACE TANK has landed on the planet Orion, a series of alien tanks, surface hoppers, and spacecrafts will attack. How long can you hold out commander? This game makes use of the Beeb's fast scrolling ability. Can be used with either keyboard or joysticks. Top ten table. Pause option.

HORSES (B)(E)
Come on now, don't be shy, choose one of the six horses and let's see what you can do. How many of the fences can you complete at the Orion arena, especially with the clock ticking away? New riders can try one of the more docile horses while others may like to risk one of the more lively beasts! Can be used with either keyboard or joysticks. Top ten table. Pause option.

STAR HAWKS (B)(E)
Can you stop the STAR HAWKS before they stop you? Slow work means the generation of more laser firing mutant hawks. Based on the games of Galaxian and Gorf. Can be used with either keyboard or joysticks. Top eight table. Pause option.

HANGMAN (B)(E)
Let words become fun again with our three language, (ENGLISH, FRENCH, ITALIAN), version of the popular game of HANGMAN. There are 3 levels of play for each language. All words can be replaced or removed, and new ones can be added. HANGMAN comes with an instruction program giving full details for parents and teachers. Once running prying eyes cannot access the word lists!

EARLY YEARS (B)(E) For children between 3-6 years of age.
These two packages give an adult or older child a means to take a younger child through a series of simple game type tasks to enforce idea's. The emphasis is on learning through fun. Topics covered include subtraction, addition, recognition, colour, shapes, sizes, sounds/notes, co-ordination, distances, estimates, directions.

EARLY YEARS 1
A) MICKEY THE MONKEY and his apple tree make subtraction fun.
B) COLOUR BLOCKS bring sizes and colour into perspective.
C) MERRY MUSIC turns the keyboard into a musical keyboard.
D) FUNNY FACES presents a line up, which one is the suspect?
E) FRED THE FROG needs co-ordinated help to get across the pond.

EARLY YEARS 2
A) THE POND seems very active today
B) SPEED is required to keep the cake on the conveyor belt.
C) DIRECTIONS seem to be needed by everyone in Orion village.
D) ORDER the blocks.
E) SID THE SPIDER needs some help to get out of the maze.

All prices are FULLY inclusive for UK orders.
Please add £1 per tape for non-UK addresses.

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NOUGHTS AND CROSSES!!!

KAY-ESS Computer Products,
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Romleighs Park,
Harold Wood,
Essex RM3 0XF.

Quadline listing

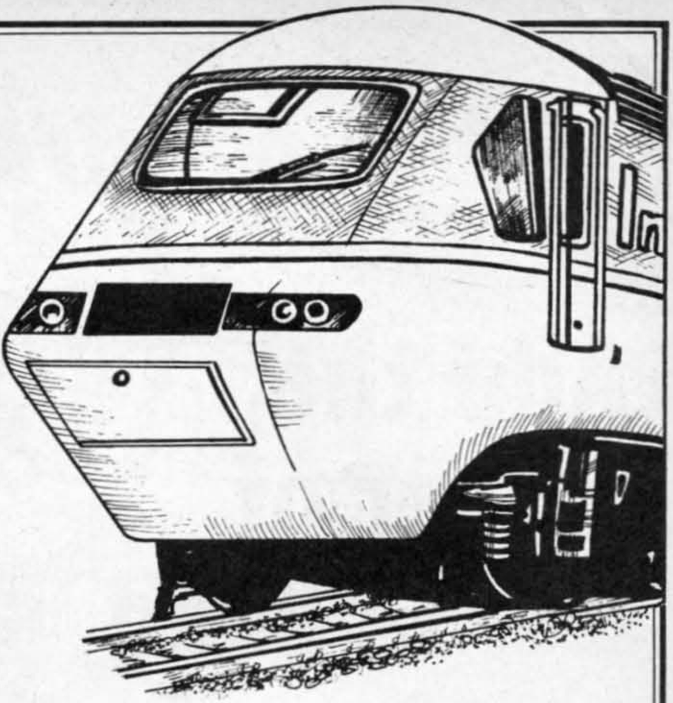
From Page 136

```
1480 IF level=50 PROCcheckwin(-1)
     :ENDPROC
1490 PROCcheckwin(1)
1500 IF FLAG ENDPROC
1510 PROCcheckwin(5)
1520 IF FLAG ENDPROC
1530 PROCcheckwin(-1)
1540 ENDPROC
1550 DEF PROCvalid(X1%(1),Y1%(1)
     ,X1%(2),Y1%(2),X1%(3),Y1%(3)
     ,X1%(4),Y1%(4),C%)
1560 LOCAL CO%
1570 IF C%=4OR C%=20someonewins=C%
     :FLAG=TRUE
     :PROCshowwinner(X1%(1),Y1%(1)
     ,X1%(2),Y1%(2),X1%(3),Y1%(3)
     ,X1%(4),Y1%(4),C%)
     :ENDPROC
1580 REPEAT
1590 CO%=RND(4)
1600 UNTIL B%(X1%(CO%),Y1%(CO%))=0
     AND B%(X1%(CO%+1),Y1%(CO%+1))<>0
     OR B%(X1%(CO%),Y1%(CO%))=0
     AND B%(X1%(CO%-1),Y1%(CO%-1))<>0
1610 IF B%(X1%(CO%),Y1%(CO%)-1)<>0
     AND B%(X1%(CO%),Y1%(CO%))=0
     THEN B%(X1%(CO%),Y1%(CO%))=1
     :Y%(X1%(CO%))=Y%(X1%(CO%))+1
     :COLOUR 2
     :PROCprintcounter(X1%(CO%))
     :FLAG=TRUE
     :X%=10
     :Y%=10
     :CO%=5
     :
     ELSE FLAG=FALSE
1620 ENDPROC
1630 DEF PROCshowwinner(X1%(1),Y1%(1)
     ,X1%(2),Y1%(2),X1%(3),Y1%(3)
     ,X1%(4),Y1%(4),C%)
1640 SOUND 1,2,20,200
1650 LOCAL T%
1660 IF C%=4COLOUR 9
     ELSE COLOUR 11
1670 FOR T%=1TO 4
1680 PRINT TAB(X1%(T%)*2-1,(7-Y1%(T%)
     )*2)CHR$ 128
1690 NEXT
1700 PROCdelay(50)
1710 ENDPROC
1720 DEF PROCinit
1730 VDU 19,0,4,0,0,0,19,1,0,0,0
     ,0,19,4,13,0,0,0
1740 VDU 23,128,60,126,255,255,255
     ,255,126,60
1750 VDU 23,129,129,66,36,24,24
     ,36,66,129
1760 DIM B%(7,6),Y%(7),X1%(5),Y1%(5)
     ,X2%(7),Y2%(6),data 9
1770 me%=0
     :you%=0
     :Z%=FALSE
1780 ENVELOPE 1,4,0,0,0,2,1,8,45
     ,-9,0,-126,126,0
1790 ENVELOPE 2,5,128,-25,-25,15
     ,25,25,126,0,0,-1,126,126
1800 ENDPROC
1810 DEF PROCprintcounter(X%)
1820 LOCAL T%
1830 IF colour=2
     :PROCbig("         ",3,0)
1840 FOR T%=6TO Y%(X%)STEP -1
1850 COLOUR colour
1860 PRINT TAB(X%*2-1,(7-T%)*2)
     CHR$ 128
1870 SOUND 1,1,T%*20+50,5
1880 TIME =0
     :REPEAT UNTIL TIME >20
1890 COLOUR 1
1900 IF T%>Y%(X%)PRINT TAB(X%*2-1
     ,(7-T%)*2)CHR$ 128
1910 NEXT
1920 ENDPROC
1930 DEF PROCprintcountersleft(colour)
1940 counters=counters-1
1950 VDU 26
1960 COLOUR colour
     :COLOUR 129
1970 PROCbig(STR$ (counters DIV 2)+
     " ",17,25+((colour-2)*3))
1980 VDU 28,3,18,17,3
1990 COLOUR 128
2000 ENDPROC
2010 DEF PROCawinner(C%,c%)
2020 VDU 26
2030 CLS
2040 COLOUR 6
2050 IF C%=4AND c% PROCbig("I the
      mighty one",2,4)
     :PROCbig("win again!",5,7)

     ELSE IF C%=20AND c% PROCbig(
     "Unfortunatly you",2,4)
     :PROCbig("appear to have won."
     ,1,7)
     ELSE PROCbig("We seem to have"
     ,2,4)
     :PROCbig("drawn.",7,8)
2060 PROCbig("I suppose that you"
     ,1,12)
     :PROCbig("want another game!"
     ,1,15)
2070 PROCbig("Press that space bar"
     ,0,18)
     :PROCbig("if you do!",5,21)
2080 *FX15,1
2090 q=GET
     :IF q=32ENDPROC
     :
     ELSE CLS
     :VDU 31,8,15
     :PROCbig("bye!",1,2)
     :END
2100 DEF PROCdelay(T%)
2110 LOCAL t%
2120 t%=TIME
     :REPEAT UNTIL TIME >t%+T%*10
2130 ENDPROC
2140 DEF PROCshuffle(X%,Y%)
2150 LOCAL T%,q%,Z%,FLAG
2160 FOR T%=1TO X%
     :X2%(T%)=0
     :NEXT
2170 FOR T%=1TO Y%
     :Y2%(T%)=0
     :NEXT
2180 T%=1
     :REPEAT
2190 FLAG=FALSE
2200 q%=RND(X%)
     :FOR Z%=1TO T%
     :IF q%=X2%(Z%)
     THEN Z%=T%+1
     :FLAG=TRUE
2210 NEXT
2220 IF NOT FLAG AND T%<X%+1 X2%(T%)=
     q%
     :T%=T%+1
2230 UNTIL T%>X%
2240 T%=1
     :REPEAT
2250 FLAG=FALSE
2260 q%=RND(Y%)
     :FOR Z%=1TO T%
     :IF q%=Y2%(Z%)
     THEN Z%=T%+1
     :FLAG=TRUE
2270 NEXT
2280 IF NOT FLAG AND T%<Y%+1 Y2%(T%)=
     q%
     :T%=T%+1
2290 UNTIL T%>Y%
2300 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 165.

DRIVE IT!



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Will you get your train in on time?

Your performance will be monitored for end of game percentage rating providing that you have not been relieved of the controls for endangering the lives of your passengers.

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* Document merge (will merge two documents into one from disc).
* Addresses all four drive units allowed by your BBC disc system.

Plus many more professional features.

SCRIBE comes in ROM with five minute fitting instructions, printer utilities on disc and a comprehensive manual.

PRICE £59.95

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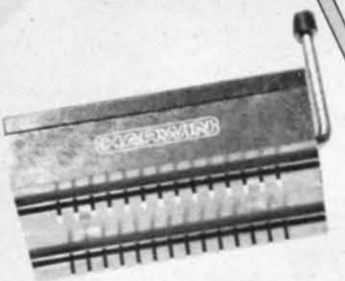

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- Full, simple to follow instructions supplied

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Toolkit listing

From Page 111

Listing I

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```
 10 HIMEM =&6000
 20 jmp=&7800
 30 PROCassemble(2)
 40 init=jmp
    : read=jmp+3
 50 write=jmp+6
 60 seek=jmp+9
    : readID=jmp+&0C
 70 format=jmp+&0F
    : verify=jmp+&12
 80 mkcat=jmp+&15
 90 B%=HIMEM
    : D%=0
    : CALL init
100 quit%=FALSE
110 REPEAT
120 REPEAT
130 INPUT "Read, Write, Seek, readId
    , Format, Verify or Quit? "Q$
140 Q%=INSTR("RrWwSsIiFfVvQq",Q$)
150 UNTIL Q%>0
160 Q%=(Q%+1)DIV 2
    : ON Q% GOTO 280 ,320 ,360
    ,400 ,480 ,200 ,180
170 REM _______________________
     QUIT
180 quit%=TRUE
    : GOTO 610
190 REM _______________________
     Verify
200 INPUT "Enter starting track
     and number of tracks",I%,N%
210 FOR T%=I% TO I%+N%-1
220 CALL verify
230 @%=4
    : PRINT T%;
240 NEXT
250 PRINT
260 GOTO 600
270 REM _______________________
     Read
280 INPUT "Enter track, sector and
     number of sectors",T%,S%,N%
290 CALL read
300 GOTO 600
310 REM _______________________
     Write
320 INPUT "Enter track, sector and
     number of sectors",T%,S%,N%
330 CALL write
340 GOTO 600
350 REM _______________________
     Seek
360 INPUT "Enter track",T%
370 CALL seek
380 GOTO 600
390 REM _______________________
     Read ID
400 INPUT "Enter track and no of
     fields",T%,N%
410 CALL readID
420 PRINT "ID fields"'" Trk  Hd
      Sec Len"
430 @%=4
    : FOR I%=B% TO B%+N%*4-1
    STEP 4
440 FOR J%=I% TO I%+3
    : PRINT ~?J%;
    : NEXT
    : PRINT
450 NEXT
460 GOTO 600
470 REM _______________________
     Format
480 INPUT "Enter no of tracks"
    ,F%
490 IF F%=40 OR F%=80 P%=0
    : Q%=F%-1
    : INPUT "Formatting the whole
     disk, OK? "Y$
    : M%=F%
    : GOTO 510
500 @%=0
    : INPUT "Starting track? "P%
    : Q%=P%+F%-1
    : PRINT "Formatting tracks "P%
    " to "Q%;
    :INPUT ", OK?"Y$
510 IF INSTR("Yy",Y$)=0 GOTO 610
520 N%=10
530 FOR T%=P% TO Q%
540 CALL format
550 @%=4
    : PRINT T%;
560 NEXT
570 PRINT
580 IF P%=0 T%=M%
    : CALL mkcat
590 GOTO 600
600 REM PROCprt_fcb(jmp)
610 PRINT
    : UNTIL quit%
620 END
630 DEF PROCprt_fcb(jmp)
640 PRINT "Error byte: "~jmp?&19
650 PRINT "Drive "jmp?&1A", buffer
     "~jmp!&1B
660 PRINT "Npars "jmp?&1F", command
     "~jmp?&20
670 PRINT "Track "jmp?&21", sector
     "jmp?&22
680 P%=jmp+&23
    : Q%=jmp+&20+jmp?&1F
690 PRINT "Parameters ";
700 FOR K%=P% TO Q%
    : PRINT ~?K%;
    : NEXT
    : PRINT
710 ENDPROC
720 DEF PROCassemble(L%)
730 REM 8271 disc controller utiliti
    es 23.jan 83
740 REM
750 osasci=&FFE3
760 osword=&FFF1
770 REM
780 REM Zero page usage.
790 ptr=&70
800 REM
810 FOR pass=0 TO 1
820 P%=jmp
830 [OPT pass*L%
840 \ Jump table for Basic entries.
850 jmp initfcb
860 jmp read
870 jmp write
880 jmp seek
890 jmp readID
900 jmp format
910 jmp verify
920 jmp mkcat
930 \
940 .scan EQUB 0 \ a scan operation?
950 .error EQUB 0 \ error byte
960 ]
970 fcb =P%
980 [OPT pass*L%
990 .drive EQUB 0
1000 .bufadr EQUD 0
1010 .npars EQUB 0 \ no of parameters
      to command
1020 .cmmd EQUB 0 \ 8271 command
1030 .track EQUB 0
1040 .sector EQUB 0
1050 ]
1060 P%=P%+4
     : REM parameter space
1070 REM
1080 REM 8271 commands.
1090 cmdscn = &40
     : REM scan data
1100 cmdwr = &4B
     : REM write data
1110 cmdrd = &53
     : REM read data
1120 cmdrID = &5B
```

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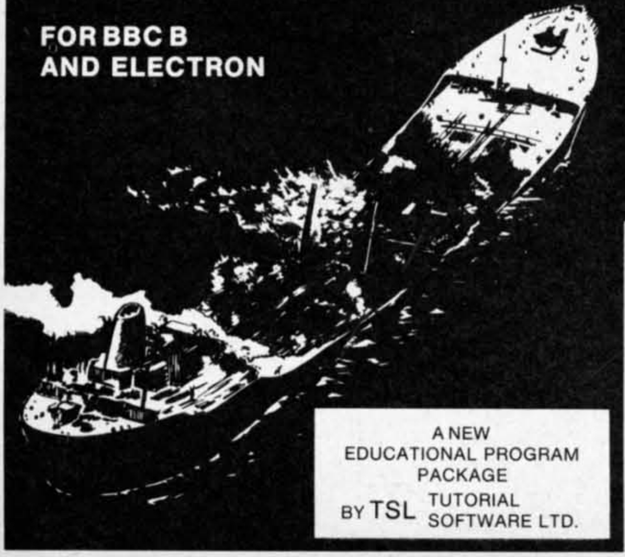

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Toolkit listing

From Page 143

```
     : REM read ID fields
1130 cmdver = &5F
     : REM verify data
1140 cmdfm = &63
     : REM format track
1150 cmdsk = &69
     : REM seek track
1160 REM
1170 gap1 = 22-6
     : REM formatting
1180 gap3 = 27-6
     : REM formatting
1190 REM
1200 T40 = 40*10
     : REM sectors on a 40-track
      disc
1210 T80 = 80*10
     : REM sectors on an 80-track
      disc
1220 REM
1230 REM Basic resident integer
      variables.
1240 B=FNintvar("B")
     : REM buffer address
1250 D=FNintvar("D")
     : REM drive 0.
1260 H=FNintvar("H")
     : REM head (drive AND 1)
1270 N=FNintvar("N")
     : REM no of sectors
1280 S=FNintvar("S")
     : REM sector
1290 T=FNintvar("T")
     : REM track
1300 [OPT pass*L%
1310 .initfcb
1320 lda D
1330 sta drive
1340 ldx #4
1350 .init1 lda B-1,X
1360 sta fcb,X
1370 dex
1380 bne init1
1390 rts
1400 \
1410 \ Get number of sectors - must
      not exceed 10-S%.
1420 .nsect lda #10
1430 sec
1440 sbc S
1450 cmp N
1460 bcc P%+5 \ N%>10-S% - make
      it 10-S%
1470 lda N \ N%<=10-S%
1480 ora #&20
1490 rts
1500 \
1510 \ Read N% sectors starting
      at sector S% on track T%.
1520 \ Buffer address & drive must
      be set up before this call.
1530 .read lda #cmdrd
1540 .setpar
1550 sta cmmd
1560 lda #0
1570 sta scan
1580 lda #3
1590 sta npars
1600 lda S
1610 sta sector
1620 jsr nsect
1630 sta fcb+9
1640 .settrk
1650 lda T
1660 sta track
1670 \
1680 .osw lda #&7F
1690 ldx #fcb MOD 256
1700 ldy #fcb DIV 256
1710 jsr osword
1720 jsr errmsg
1730 rts
1740 \
1750 \ Write N% sectors starting
      at sector S% on track T%.
1760 \ The buffer address and the
      drive must be set up before
1770 \ the call.
1780 .write lda #cmdwr
1790 jmp setpar
1800 \
1810 \ Seek track T%; drive must
      be set before call.
1820 .seek lda #1
1830 sta npars
1840 lda #cmdsk
1850 jmp setpar
1860 \
1870 \ Read ID fields from track
      T% - the number of fields
1880 \ to read is in N% (max 10).
1890 .readID
1900 lda #cmdrID
1910 sta cmmd
1920 lda #0
1930 sta scan
1940 sta sector
1950 lda #3
1960 sta npars
1970 lda #10
1980 cmp N
1990 bcc P%+5 \ N)10 - use 10
2000 lda N
2010 sta fcb+9
2020 jmp settrk
2030 \
2040 \ Format track T%.
2050 \ The buffer in B% must be
      at least 40 bytes long.
2060 \ N% is the number of sectors
      per track.
2070 .format
2080 lda #0
2090 sta scan \ not a scan
2100 lda B
2110 sta ptr
2120 lda B+1
2130 sta ptr+1
2140 lda D
2150 and #1
2160 sta H
2170 lda N \ number of sectors/track
2180 tax
2190 asl A
2200 asl A \ times 4
2210 tay
2220 dey \ start with #sectors-1
2230 .form1 dex \ count the sectors
2240 lda #1 \ sector size (=256
      bytes)
2250 sta (ptr),Y \ track
2260 dey
2270 txa \ number of sector in track
2280 sta (ptr),Y
2290 dey
2300 lda H \ head (0 or 1)
2310 sta (ptr),Y
2320 dey
2330 lda T \ set up the ID fields
2340 sta (ptr),Y
2350 dey
2360 bpl form1
2370 \
2380 \ Now write the track.
2390 lda #5
2400 sta npars
2410 lda #cmdfm
2420 sta cmmd
2430 lda T
2440 sta track
2450 lda #gap3
2460 sta fcb+8
2470 lda N
2480 ora #&20 \ 256 byte sectors
2490 sta fcb+9
2500 lda #0 \ mini disk
2510 sta fcb+10
2520 lda #gap1
2530 sta fcb+11
2540 jmp osw
2550 \
2560 \ Verify track T% - drive must
      be set up before a call.
```

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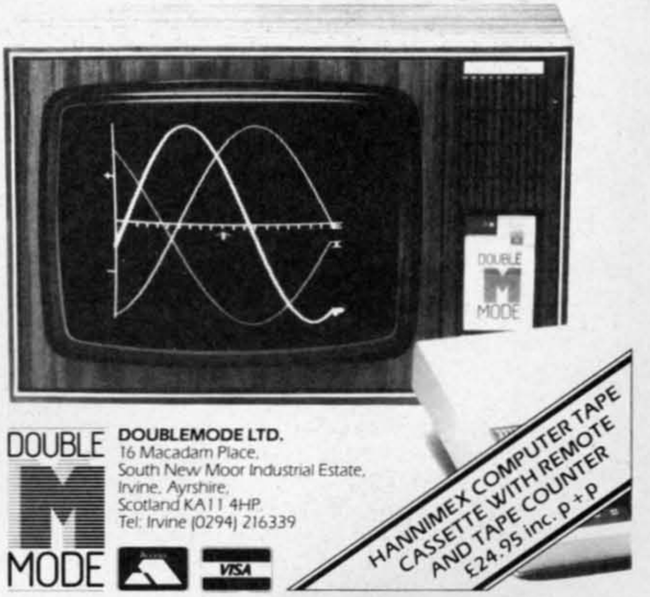

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Toolkit listing

From Page 145

```
2570 .verify
2580 lda #5
2590 sta npars
2600 lda #cmdver
2610 sta cmmd
2620 lda T
2630 sta track
2640 lda #0
2650 sta sector
2660 lda #&29 \ number & size of
      sectors
2670 sta fcb+9
2680 jmp osw
2690 \
2700 \ Initialise the (Acorn) catalog
      in sectors 0 & 1.
2710 \ The drive and buffer must
      have been set up before
2720 \ a call - the buffer need
      only be 256 bytes long.
2730 \ This routine is used directly
      after formatting an entire
2740 \ disk - and expects T% to
      be the number of tracks
2750 \ on the disk.
2760 .mkcat lda B
2770 sta ptr
2780 lda B+1
2790 sta ptr+1
2800 ldy #0 \ make 256 zeros for
      sector 0
2810 tya
2820 sta (ptr),Y
2830 dey
2840 bne P%-3
2850 \ Write the zeros to the sector.
2860 lda #3
2870 sta npars
2880 lda #cmdwr
2890 sta cmmd
2900 lda #0
2910 sta track
2920 sta sector
2930 lda #&21
2940 sta fcb+9
2950 lda #&7F
2960 ldx #fcb MOD 256
2970 ldy #fcb DIV 256
2980 jsr osword
2990 jsr errmsg
3000 \
3010 \ Sector 1 is also zero except
      for bytes 6 & 7:
3020 \ byte 6 contains the high
      order bits of the number of
3030 \ sectors on the disc and byte
      7 contains the low order byte.
3040 lda #80
3050 cmp T
3060 bcs P%+8
3070 lda #T80 MOD 256
3080 ldx #T80 DIV 256
3090 bne P%+6
3100 lda #T40 MOD 256
3110 ldx #T40 DIV 256
3120 ldy #6
3130 sta (ptr),Y
3140 iny
3150 txa
3160 sta (ptr),Y
3170 lda #1
3180 sta sector
3190 jmp osw
3200 \
3210 \ The disc controller error
      messages.
3220 .errmsg
3230 lda &FE81 \ FDC result register
3240 sta error
3250 bne P%+8
3260 lda scan
3270 bne P%+3
3280 rts \ code is 0 and not scan
      -> no error
3290 \
3300 \ Find the message.
3310 \
3320 lda error
3330 and #&1E
3340 tax : already times 2
3350 lda msgtbl,X
3360 sta ptr
3370 lda msgtbl+1,X
3380 sta ptr+1
3390 jsr prtmsg
3400 \
3410 \ Print track and sector where
      the read started.
3420 lda track
3430 jsr cnvt
3440 sta trk
3450 sty trk+1
3460 \
3470 lda sector
3480 jsr cnvt
3490 sta sec
3500 sty sec+1
3510 lda #at MOD 256
3520 sta ptr
3530 lda #at DIV 256
3540 sta ptr+1
3550 jsr prtmsg
3560 .errfin
3570 rts
3580 \
3590 \ Convert the byte in A (0
      <= A < 100) to decimal.
3600 .cnvt ldx #0
3610 cmp #10
3620 bcc cnvtlo
3630 inx
3640 sec
3650 sbc #10
3660 bne cnvt+2
3670 .cnvtlo
3680 ora #ASC "0"
3690 tay \ save lo digit in Y
3700 txa
3710 ora #ASC "0"\ hi digit in A
3720 rts
3730 \
3740 .prtmsg
3750 ldy #0
3760 lda (ptr),Y
3770 beq prtfin
3780 jsr osasci
3790 iny
3800 bne prtmsg+2
3810 .prtfin
3820 rts
3830 \
3840 \ The message table.
3850 \ completion
3860 \ type code
3870 .msgtbl
3880 EQUW scannot \ 00 00
3890 EQUW scanEQ \ 00 01
3900 EQUW scanNE \ 00 10
3910 EQUW unkn \ 00 11
3920 EQUW clock \ 01 00
3930 EQUW dma \ 01 01
3940 EQUW idCRC \ 01 10
3950 EQUW dataCRC \ 01 11
3960 EQUW drRdy \ 10 00
3970 EQUW wprot \ 10 01
3980 EQUW trk0 \ 10 10
3990 EQUW wrtflt \ 10 11
4000 EQUW secNF \ 11 00
4010 EQUW unkn \ 11 01
4020 EQUW unkn \ 11 10
4030 EQUW unkn \ 11 11
4040 \
4050 \ Messages
4060 .scannot EQUS "Scan not met"
4070 EQUB 0
4080 .scanEQ EQUS "Scan met equal"
4090 EQUB 0
4100 .scanNE EQUS "Scan met not equal
      "
4110 EQUB 0
4120 .unkn EQUS "Unknown error"
4130 EQUB 0
```

From Page 147

```
4140 .clock EQUS "Clock error"
4150 EQUB 0
4160 .dma EQUS "Late DMA"
4170 EQUB 0
4180 .idCRC EQUS "ID CRC error"
4190 EQUB 0
4200 .dataCRC EQUS "Data CRC error"
4210 EQUB 0
4220 .drRdy EQUS "Drive not ready"
4230 EQUB 0
4240 .wprot EQUS "Disc write protecte
     d"
4250 EQUB 0
4260 .trk0 EQUS "Track 0 not found"
4270 EQUB 0
4280 .wrtflt EQUS "Write fault"
4290 EQUB 0
4300 .secNF EQUS "Sector not found"
4310 EQUB 0
4320 \
4330 .at EQUS " at "
4340 .trk EQUB 0 \ 2 decimal digits
4350 EQUB 0
4360 EQUB ASC "/"
4370 .sec EQUB 0
4380 EQUB 0
4390 EQUB &0D \ end msg with newline
4400 EQUB 0 \ end of message
4410 \
4420 ]
4430 NEXT
4440 ENDPROC
4450 DEF FNintvar(C$)=(ASC C$-
     ASC "@")*4+&400
```

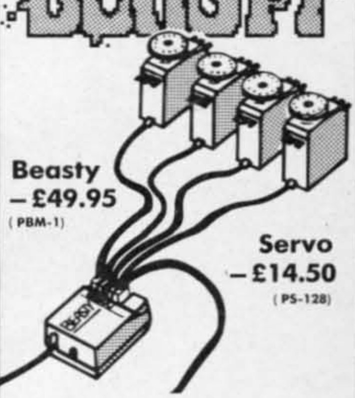
Listing II

```
930 ]
940 scan =P%
    : ?P%=0
    : P%=P%+1
950 error =P%
    : ?P%=0
    : P%=P%+1
960 REM
970 fcb =P%
980 REM
990 drive =P%
    : ?P%=0
    : P%=P%+1
1000 bufadr=P%
    : !P%=0
    : P%=P%+4
1010 npars =P%
    : ?P%=0
    : P%=P%+1
1020 cmmd =P%
    : ?P%=0
    : P%=P%+1
1030 track =P%
    : ?P%=0
    : P%=P%+1
1040 sector=P%
    : ?P%=0
    : P%=P%+1
1050 REM
3830 ]
3840 REM Messages
3850 scannot = FNstring("Scan not
     met")
3860 scanEQ = FNstring("Scan met
     equal")
3870 scanNE = FNstring("Scan met
     not equal")
3880 unkn = FNstring("Unknown error")
3890 clock = FNstring("Clock error")
3900 dma = FNstring("Late DMA")
3910 idCRC = FNstring("ID CRC error")
3920 dataCRC = FNstring("Data CRC
     error")
3930 drRdy = FNstring("Drive not
     ready")
3940 wprot = FNstring("Disc write
     protected")
3950 trk0 = FNstring("Track 0 not
     found")
3960 wrtflt = FNstring("Write fault")
3970 secNF = FNstring("Sector not
     found")
3980 REM
3990 REM The message table.
4000 REM completion
4010 REM type code
4020 msgtbl=P%
4030 !P% = scannot
     : P%=P%+2
     : REM 00 00
4040 !P% = scanEQ
     : P%=P%+2
     : REM 00 01
4050 !P% = scanNE
     : P%=P%+2
     : REM 00 10
4060 !P% = unkn
     : P%=P%+2
     : REM 00 11
4070 !P% = clock
     : P%=P%+2
     : REM 01 00
4080 !P% = dma
     : P%=P%+2
     : REM 01 01
4090 !P% = idCRC
     : P%=P%+2
     : REM 01 10
4100 !P% = dataCRC
     : P%=P%+2
     : REM 01 11
4110 !P% = drRdy
     : P%=P%+2
     : REM 10 00
4120 !P% = wprot
     : P%=P%+2
     : REM 10 01
4130 !P% = trk0
     : P%=P%+2
     : REM 10 10
4140 !P% = wrtflt
     : P%=P%+2
     : REM 10 11
4150 !P% = secNF
     : P%=P%+2
     : REM 11 00
4160 !P% = unkn
     : P%=P%+2
     : REM 11 01
4170 !P% = unkn
     : P%=P%+2
     : REM 11 10
4180 !P% = unkn
     : P%=P%+2
     : REM 11 11
4190 REM
4200 at = P%
     : $P%=" at "
     : P%=P%+4
4210 trk = P%
     : ?P%=0
     : P%=P%+2
     : REM 2 decimal digits
4220 ?P% = ASC "/"
     : P%=P%+1
4230 sec = P%
     : !P%=&0D0000
     : P%=P%+4
4240 NEXT
4250 ENDPROC
4260 DEF FNintvar(C$)=(ASC C$-
     ASC "@")*4+&400
4270 DEF FNstring(S$)
     : LOCAL Q%
4280 Q%=P%
     : $P%=S$
     : P%=P%+LEN S$
4290 ?P%=0
     : P%=P%+1
4300 =Q%
```

This listing is included in this month's cassette tape offer. See order form on Page 165.

SLAVES FROM AROUND £49!

THE BEASTY



Beasty – £49.95
(PBM-1)

Servo – £14.50
(PS-128)

Servos:
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60 degrees in 0.25 secs, 100 degrees range.

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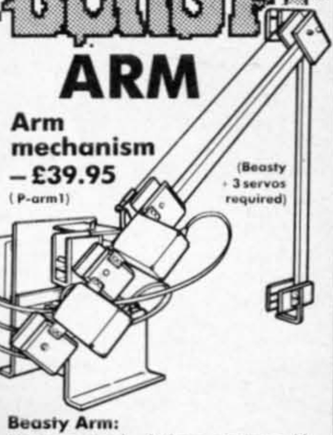

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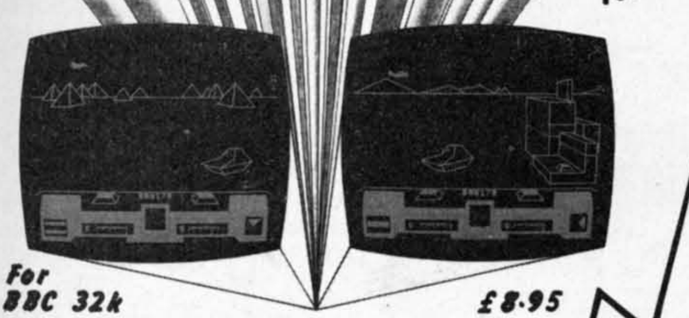

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★ NPAUSE turn off ability to freeze game
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Large picture shows BBC Computer System and a Quickshot II Joystick. Small inset just a few of the joysticks that will work with the patch lead. Screenshot by kind permission of SUPERIOR SOFTWARE

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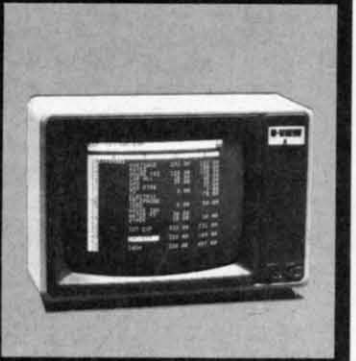

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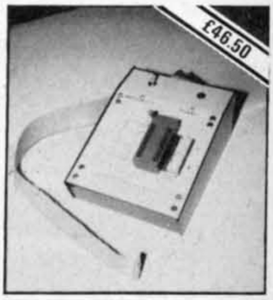

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Monitor listing

From Page 51

Listing I

```
 10 REM Set up data file for Machine
    -code monitor for 6502 ALAN
     PRICE
 20 REM (C) MICRO USER 1984
 30 DIM M% 200
 40 FOR I%=0TO 2STEP 2
    :P%=M%
 50 [OPT I%
    :STA &407
    :STX &406
    :STY &405
    :PLA
    :STA &404
    :PLA
    :STA &408
    :PLA
    :STA &409
    :TSX
    :STX &40A
 60 JSR &BD52
    :STA &20
    :STA &A
    :STA &28
    :DEC &28
    :LDA #&7E
    :JSR &FFF4
    :LDA &16
    :STA &B
    :LDA &17
    :STA &C
    :JMP &BAE1
 70 .M LDX &40A
    :TXS
    :LDA &404
    :PHA
    :LDA &407
    :LDX &406
    :LDY &405
    :PLP
    :JMP(&408)
 80 .Z LDX #3
    :.Z1 LDA &45C,X
    :BNE Z2
    :DEX
    :BNE Z1
    :.Z2 LDA &440
    :STA &2A
    :LDA &441
    :STA &2B
    :TXA
 90 .Z3 PHA
    :LDY #0
    :.Z4 LDA (&2A),Y
    :CMP &45C,X
    :BNE Z6
    :INY
    :DEX
    :BPL Z4
    :.Z5 PLA
    :LDA &2A
    :STA &440
    :LDA &2B
    :STA &441
    :RTS
100 .Z6 INC &2A
    :BNE Z7
    :INC &2B
    :.Z7 LDA &2A
    :CMP &454
    :LDA &2B
    :SBC &455
    :BCS Z5
110 PLA
    :TAX
    :BCC Z3
    :]
    :NEXT
    :C%=M
    :Z%=Z
120 CH=OPENOUT ("MONDAT")
    :PRINT #CH,C%-M%,Z%-M%,P%-M%
    :FOR I%=M%TO P%
    :BPUT #CH,?I%
    :NEXT
130 FOR I%=0TO 255
    :READ J%
    :BPUT #CH,J%
    :READ A$
    :FOR J%=1TO 3
    :BPUT #CH,ASC (MID$(A$,J%,1))
    :NEXT
    :READ J%
    :BPUT #CH,J%
    :NEXT
140 CLOSE #CH
    :END
150 REM DATA for each instruction.
160 DATA 1,BRK,0,2,ORA,5,0,///
    ,0,0,///,0,0,///,0,2,ORA,2
    ,2,ASL,2,0,///,0
170 DATA 1,PHP,0,2,ORA,1,1,ASL
    ,7,0,///,0,0,///,0,3,ORA,2
    ,3,ASL,2,0,///,0
180 DATA 2,BPL,8,2,ORA,6,0,///
    ,0,0,///,0,0,///,0,2,ORA,3
    ,2,ASL,3,0,///,0
190 DATA 1,CLC,0,3,ORA,4,0,///
    ,0,0,///,0,0,///,0,3,ORA,3
    ,3,ASL,3,0,///,0
200 DATA 3,JSR,12,2,AND,5,0,///
    ,0,0,///,0,2,BIT,2,2,AND,2
    ,2,ROL,2,0,///,0
210 DATA 1,PLP,0,2,AND,1,1,ROL
    ,7,0,///,0,3,BIT,2,3,AND,2
    ,3,ROL,2,0,///,0
220 DATA 2,BMI,8,2,AND,6,0,///
    ,0,0,///,0,0,///,0,2,AND,3
    ,2,ROL,3,0,///,0
230 DATA 1,SEC,0,3,AND,4,0,///
    ,0,0,///,0,0,///,0,3,AND,3
    ,3,ROL,3,0,///,0
240 DATA 1,RTI,11,2,EOR,5,0,///
    ,0,0,///,0,0,///,0,2,EOR,2
    ,2,LSR,2,0,///,0
250 DATA 1,PHA,0,2,EOR,1,1,LSR
    ,7,0,///,0,3,JMP,10,3,EOR,2
    ,3,LSR,2,0,///,0
260 DATA 2,BVC,8,2,EOR,6,0,///
    ,0,0,///,0,0,///,0,2,EOR,3
    ,2,LSR,3,0,///,0
270 DATA 1,CLI,0,3,EOR,4,0,///
    ,0,0,///,0,0,///,0,3,EOR,3
    ,3,LSR,3,0,///,0
280 DATA 1,RTS,11,2,ADC,5,0,///
    ,0,0,///,0,0,///,0,2,ADC,2
    ,2,ROR,2,0,///,0
290 DATA 1,PLA,0,2,ADC,1,1,ROR
    ,7,0,///,0,3,JMP,9,3,ADC,2
    ,3,ROR,2,0,///,0
300 DATA 2,BVS,8,2,ADC,6,0,///
    ,0,0,///,0,0,///,0,2,ADC,3
    ,2,ROR,3,0,///,0
310 DATA 1,SEI,0,3,ADC,4,0,///
    ,0,0,///,0,0,///,0,3,ADC,3
    ,3,ROR,3,0,///,0
320 DATA 0,///,0,2,STA,5,0,///
    ,0,0,///,0,2,STY,2,2,STA,2
    ,2,STX,2,0,///,0
330 DATA 1,DEY,0,0,///,0,1,TXA
    ,0,0,///,0,3,STY,2,3,STA,2
    ,3,STX,2,0,///,0
340 DATA 2,BCC,8,2,STA,6,0,///
    ,0,0,///,0,2,STY,3,2,STA,3
    ,2,STX,4,0,///,0
350 DATA 1,TYA,0,3,STA,4,1,TXS
    ,0,0,///,0,0,///,0,3,STA,3
    ,0,///,0,0,///,0
360 DATA 2,LDY,1,2,LDA,5,2,LDX
    ,1,0,///,0,2,LDY,2,2,LDA,2
    ,2,LDX,2,0,///,0
370 DATA 1,TAY,0,2,LDA,1,1,TAX
    ,0,0,///,0,3,LDY,2,3,LDA,2
    ,3,LDX,2,0,///,0
380 DATA 2,BCS,8,2,LDA,6,0,///
    ,0,0,///,0,2,LDY,3,2,LDA,3
    ,2,LDX,4,0,///,0
390 DATA 1,CLV,0,3,LDA,4,1,TSX
    ,0,0,///,0,3,LDY,3,3,LDA,3
    ,3,LDX,4,0,///,0
400 DATA 2,CPY,1,2,CMP,5,0,///
    ,0,0,///,0,2,CPY,2,2,CMP,2
    ,2,DEC,2,0,///,0
410 DATA 1,INY,0,2,CMP,1,1,DEX
    ,0,0,///,0,3,CPY,2,3,CMP,2
    ,3,DEC,2,0,///,0
420 DATA 2,BNE,8,2,CMP,6,0,///
```

→

Monitor listing

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```
    ,0,0,///,0,0,///,0,2,CMP,3
    ,2,DEC,3,0,///,0
430 DATA 1,CLD,0,3,CMP,4,0,///
    ,0,0,///,0,0,///,0,3,CMP,3
    ,3,DEC,3,0,///,0
440 DATA 2,CPX,1,2,SBC,5,0,///
    ,0,0,///,0,2,CPX,2,2,SBC,2
    ,2,INC,2,0,///,0
450 DATA 1,INX,0,2,SBC,1,1,NOP
    ,0,0,///,0,3,CPX,2,3,SBC,2
    ,3,INC,2,0,///,0
460 DATA 2,BEQ,8,2,SBC,6,0,///
    ,0,0,///,0,0,///,0,2,SBC,3
    ,2,INC,3,0,///,0
470 DATA 1,SED,0,3,SBC,4,0,///
    ,0,0,///,0,0,///,0,3,SBC,3
    ,3,INC,3,0,///,0
```

Listing II

```
 10 REM Machine-code monitor for
     6502 ALAN PRICE
 20 REM (C) MICRO USER 1984
 30 LOMEM =TO P
    :DIM D%1280
    :DIM E%48
    :K%=OPENIN ("MONDAT")
    :INPUT #K%,C%,Z%,P%
    :DIM M% P%
 40 C%=M%+C%
    :Z%=M%+Z%
    :P%=M%+P%
    :FOR I%=M%TO P%
    :?I%=BGET #K%
    :NEXT
 50 FOR I%=0TO 1279
    :?(D%+I%)=BGET #K%
    :NEXT
    :CLOSE #K%
 60 LOMEM =P%
    :FOR I%=E%TO E%+44STEP 4
    :!I%=0
    :NEXT
 70 ?2=LOMEM MOD 256
    :?3=LOMEM DIV 256
 80 P%=0
    :A%=0
    :O%=3
    :U%=&8000
    :W%=0
 90 REM ################################
    ######
100 REM Restart Monitor. Previous
     values are preserved, except
     for Stack Pointer which is
     reset.
110 ON ERROR GOSUB 160
    :CALL C%
120 ?&202=M%MOD 256
    :?&203=M%DIV 256
    :*FX229,1
130 B%=&FF0002+P%
    :Q%=&1FF
    :GOSUB 190
    :CALL C%
140 ON ERROR OFF
    :*FX229,0
150 END
160 P%=(B%AND &FFFF)-2
    :Q%=((B%DIV &10000)AND &FF)+&100
    :GOSUB 740
    :IF H%<0
    THEN 520
170 GOSUB 960
    :Y%=INKEY (1)
    :IF (Y%<0)AND ?P%AND (H%=0)
    THEN 540
    :
    ELSE 410
180 REM ############################
    #####
190 PRINT
    :PRINT
    :PRINT "           Machine-code
     Monitor"
200 PRINT "          =================
    ===="
210 PRINT "A,X,Y,F Set A,X,Y,Flag
     registers"
220 PRINT "P       Set Program count
    er (PC)"
230 PRINT "B,C,D   Set,Clear,Display
     breakpoints"
240 PRINT "E       Reset PC to its
     value on Entry"
250 PRINT "G       Get stack pointer
     to PC"
260 PRINT "L       List as instructi
    ons from PC"
270 PRINT "M       Display Memory
     from PC"
280 PRINT "W       Write to memory
     at PC, PC=PC+1"
290 PRINT "        Repeat until
     Esc."
300 PRINT "R,S,T   Run,Single-shot,T
    race from PC"
310 PRINT "U       Set upper limit
     for S,T,Z"
320 PRINT "H       Displays this
     text"
330 PRINT "Q,Esc   Quit- resets
     BASIC break action"
340 PRINT "V       VDU value, e.g.
     select printer"
350 PRINT "Z       Search for hex
     bytes from PC-U"
360 PRINT "<>RETURN Previous/next
     byte, next instruction"
370 PRINT "L,M,T update PC. Press
     any key to stop."
380 PRINT "A,X,Y,F are aborted uncha
    nged by Esc"
    :PRINT
390 PRINT " PC   A X Y F   Flags
      Instruction"
    :GOSUB 960
400 Y%=INKEY (1)
410 H%=0
    :IF Y%=27
    THEN 140
    :
    ELSE IF (Y%>64)AND (Y%<91)
    THEN ON (Y%-64)GOTO 470 ,570
    ,680 ,660 ,460 ,500 ,450 ,190
    ,390 ,390 ,390 ,630 ,640 ,390
    ,390 ,440 ,140 ,520 ,530 ,540
    ,560 ,700 ,610 ,480 ,490 ,720
420 IF (Y%=13)
    THEN P%=S%
    :GOSUB 960
    :
    ELSE IF (Y%=44)OR (Y%=60)
    THEN P%=P%-1
    :GOSUB 960
    :
    ELSE IF (Y%=46)OR (Y%=62)
    THEN P%=P%+1
    :GOSUB 960
    :
    ELSE IF Y%>0
    THEN 390
430 GOTO 400
440 GOSUB 860
    :P%=X%
    :GOTO 390
    :REM P
450 P%=Q%
    :GOTO 390
    :REM G
460 P%=(B%AND &FFFF)-2
    :GOTO 390
    :REM E
470 J%=&407
    :GOTO 510
    :REM A
480 J%=&406
    :GOTO 510
    :REM X
490 J%=&405
    :GOTO 510
    :REM Y
500 J%=&404
    :REM F
510 GOSUB 860
    :IF I%=27
    THEN 400
    ELSE ?J%=X%
```

Turn to Page 157

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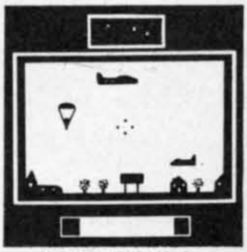

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Monitor listing

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```
    :GOTO 390
520 F%=E%+8
    :G%=E%+44
    :X%=P%
    :GOSUB 780
    :IF (J%>0)AND (H%>=0)
    THEN H%=-1
    :GOTO 540
    :
    ELSE H%=1
    :GOTO 550
    :REM R
530 H%=1
    :REM S
540 F%=E%
    :G%=E%+4
550 GOSUB 760
    :B%=(B%AND &FF0000)+P%
    :RETURN
560 GOSUB 860
    :U%=X%
    :GOTO 400
    :REM U
570 GOSUB 860
    :F%=E%+8
    :G%=E%+44
    :GOSUB 780
    :IF J%>0
    THEN PRINT "Already in."
    :GOTO 400
    :REM B
580 FOR I%=F%TO G%STEP 4
    :IF (!I%=0)
    THEN J%=I%
    :REM FREESPACE.
590 NEXT
    :IF J%<0
    THEN PRINT "Breakpoint list
     full."
    :
    ELSE !J%=X%
600 GOTO 400
610 REPEAT
    :GOSUB 860
    :IF I%<>27
    THEN ?P%=X%AND &FF
    :P%=P%+1
    :REM W
620 UNTIL I%=27
    :GOTO 390
630 GOSUB 860
    :I%=X%
    :PRINT " PC   Bytes    Chars
       Instruction"
    :H%=-1
    :REPEAT
    :GOSUB 960
    :P%=P%+J%
    :I%=I%-1
    :UNTIL (I%<=0)OR (INKEY (1)>0)
    :GOTO 400
    :REM L
640 GOSUB 860
    :REPEAT
    :@%=4
    :PRINT ~P%;
    :VDU 32
    :@%=2
    :FOR J%=P%TO P%+7
    :PRINT ~?J%;
    :NEXT
    :VDU 32,32
    :FOR J%=P%TO P%+7
    :Y%=?J%
    :GOSUB 800
650 NEXT
    :PRINT
    :P%=P%+8
    :X%=X%-8
    :UNTIL (X%<=0)OR (INKEY (1)>0)
    :GOTO 390
    :REM M
660 PRINT "Breakpoints:"
    :@%=5
    :F%=E%+8
    :G%=E%+44
    :FOR I%=F%TO G%STEP 4
    :Y%=!I%AND &FFFF
    :IF Y%
    THEN PRINT ~Y%;
670 NEXT
    :PRINT
    :GOTO 390
    :REM D
680 GOSUB 860
    :F%=E%+8
    :G%=E%+44
    :GOSUB 780
    :IF J%>0
    THEN !J%=0
    :
    ELSE PRINT "Not in breakpoint
     list."
690 GOTO 390
    :REM C
700 GOSUB 860
    :IF (X%=2)OR (X%=3)
    THEN O%=X%
710 VDU X%
    :GOTO 400
    :REM V
720 X%=W%
    :GOSUB 870
    :IF I%=27
    THEN P%=P%+1
730 W%=X%
    :CALL Z%
    :GOTO 390
    :REM Z
740 FOR I%=F%TO G%STEP 4
    :X%=!I%
    :IF X%
    THEN ?(X%AND &FFFF)=(X%DIV &1000
    0)AND &FF
750 NEXT
    :RETURN
760 FOR I%=F%TO G%STEP 4
    :X%=!I%
    :IF X%
    THEN ?(I%+2)=?(X%AND &FFFF)
    :?(X%AND &FFFF)=0
770 NEXT
    :RETURN
780 J%=-1
    :FOR I%=F%TO G%STEP 4
    :Y%=!I%AND &FFFF
    :IF Y%
    THEN IF Y%=X%
    THEN J%=I%
790 NEXT
    :RETURN
800 K%=135
    :IF Y%>127
    THEN Y%=Y%-128
    :K%=K%-4
810 IF Y%<32
    THEN K%=K%-2
    :Y%=Y%+64
820 IF Y%=32
    THEN K%=K%+16
    :Y%=47
830 IF Y%=&7F
    THEN K%=K%+16
    :Y%=115
840 IF O%=2
    THEN K%=32+ABS (K%-135)
850 VDU K%
    :PRINT CHR$ (Y%);
    :RETURN
860 X%=0
870 VDU 3
    :PRINT TAB(0,VPOS );
    :VDU Y%,63
    :PRINT ;~X%;
    :VDU 32,32,32,8,8,8
    :REPEAT
    :I%=INKEY (1)
    :UNTIL I%>0
880 IF I%=127
    THEN X%=X%DIV 16
    :GOTO 870
890 IF (I%>=48)AND (I%<58)
    THEN X%=16*X%+I%-48
    :GOTO 870
900 IF (I%>64)AND (I%<71)
    THEN X%=16*X%+I%-55
```

→

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```
    :GOTO 870
 910 IF (I%<>13)AND (I%<>27)
    THEN 870
 920 PRINT TAB(0,VPOS );
    :IF O%=2
    THEN VDU 2,Y%,63
    :PRINT ;~X%;
 930 PRINT
    :RETURN
 940 REPEAT
    :X%=INKEY (1)
    :UNTIL X%<0
    :RETURN
 950 RETURN
 960 IF P%>&FFFFP%=0
    ELSE IF P%<0P%=&FFFF
 970 PRINT TAB(0,VPOS );
    :@%=4
    :PRINT ~P%;
    :IF H%<0
    THEN 1000
 980 @%=9
    :PRINT ~A%;
    :VDU 32
    :S%=&80
    :FOR J%=1TO 8
    :IF (S%AND A%)
    THEN PRINT MID$("NV..DIZC"
    ,J%,1);
    :
    ELSE PRINT ".";
 990 S%=S%DIV 2
    :NEXT
1000 S%=P%
    :J%=0
    :REPEAT
    :K%=?S%
    :S%=S%+1
    :IF J%=0
    THEN L%=K%
    :X%=?(D%+5*L%)
    ELSE IF J%=1
    THEN V%=K%
    ELSE V%=256*K%+V%
1010 J%=J%+1
    :UNTIL J%>=X%
    :IF H%<0
    THEN @%=3
    :FOR X%=0TO J%-1
    :PRINT ~?(S%-J%+X%);
    :NEXT
    :PRINT SPC (14-POS );
    :FOR X%=0TO J%-1
    :Y%=?(S%-J%+X%)
    :GOSUB 800
    :NEXT
    :VDU 103*O%-174
    :
    ELSE IF X%=0
    THEN H%=1
1020 PRINT SPC (22-POS );
    :X%=32
    :FOR Y%=D%+5*L%+1TO D%+5*L%+4
    :VDU X%
    :X%=?Y%
    :NEXT
    :VDU 32
    :!E%=S%
    :!(E%+4)=0
1030 IF X%
    THEN ON X%GOSUB 1080 ,1110
    ,1140 ,1170 ,1220 ,1270 ,1300
    ,1340 ,1380 ,1410 ,1440 ,1470
1040 IF ((!E%)=U%)OR (!(E%+4)>=U%))
    AND (H%>=0)
    THEN VDU 32,104*O%-176,85
    :H%=1
1050 PRINT
    :RETURN
1060 REM ----------------------------
    ---
1070 REM Mode 1. Immediate mode
    , 1-byte value is operand of
     the instruction.
1080 PRINT "#&";~V%;
    :RETURN
1090 REM ----------------------------
    ----
1100 REM Mode 2. Page 0 (2-byte)
    , absolute (3-byte) address
     of operand.
1110 PRINT "&";~V%;
    :RETURN
1120 REM ----------------------------
    ----
1130 REM Mode 3. Page 0 (2-byte)
    , absolute (3-byte) address
     modified by X-reg.
1140 PRINT "&";~V%;",X";
    :RETURN
1150 REM ----------------------------
    ----
1160 REM Mode 4. 3-byte instruction
    , absolute address modified
     by Y-register.
1170 PRINT "&";~V%;",Y";
    :RETURN
1180 REM ----------------------------
    ----
1190 REM Mode 5. Indexed indirect.
     1-byte value is added to the
     contents of the
1200 REM X-register. Result is the
     address of a page 0 location
     which holds the
1210 REM address of the operand.
1220 PRINT "(&";~V%;",X)";
    :RETURN
1230 REM ----------------------------
    ----
1240 REM Mode 6. Indirect indexed.
     1-byte value is the address
     of a 2-byte
1250 REM value in page 0 which is
     added to the value of the
     Y-register for the
1260 REM address of the operand.
1270 PRINT "(&";~V%;"),Y";
    :RETURN
1280 REM ----------------------------
    ----
1290 REM Operand is the value of
     A-register.
1300 PRINT "A";
    :RETURN
1310 REM ----------------------------
    ----
1320 REM Mode 8. 1-byte signed value
     (-128/+127) is added to the
     address
1330 REM of the NEXT instruction.
1340 X%=S%+V%-2*(V%AND &80)
    :PRINT "&";~X%;
    :!(E%+4)=X%
    :RETURN
1350 REM ----------------------------
    ----
1360 REM Mode 9. Indirect jump.
     2-byte value is the address
     of a store location
1370 REM which holds the operand.
1380 !E%=!V%AND &FFFF
    :PRINT "(&";~V%;")";
    :RETURN
1390 REM ----------------------------
    -----
1400 REM Mode 10. JMP
1410 !E%=V%
    :PRINT "&";~V%;
    :RETURN
1420 REM ----------------------------
    -----
1430 REM Mode 11. RTS,RTI.
1440 !E%=(!(Q%+1)AND &FFFF)+1
    :RETURN
1450 REM ----------------------------
    ---
1460 REM Mode 12. JSR
1470 IF V%<U%
    THEN !E%=V%
1480 PRINT "&";~V%;
    :RETURN
```

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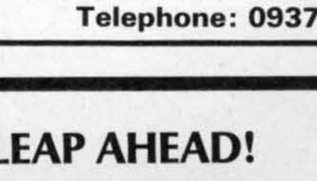

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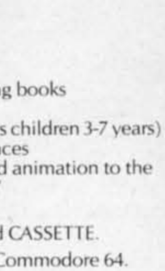

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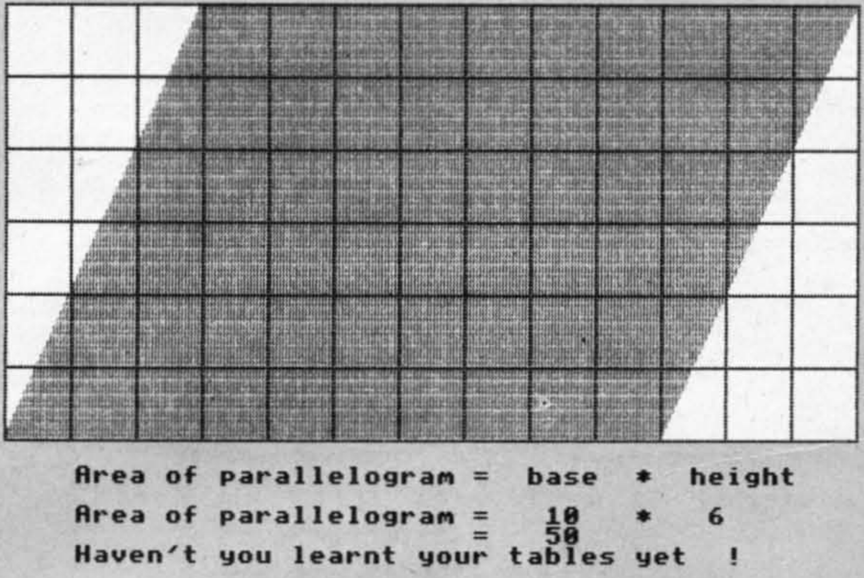


```
Area of parallelogram =  base   *   height
Area of parallelogram =   10    *    6
                      =   50
Haven't you learnt your tables yet   !
```

From Page 103

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

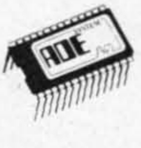
```
 10 REM AREAS
 20 REM JOHN LORD
 30 REM (c) MICRO USER 1984
 40 REM PRINTS RANDOM RECTANGLES
 50 REM PARALLELOGRAMS &TRIANGLES
 60 REM MAKES THE USER INPUT THE
 70 REM BASE, HEIGHT AND AREA OF
 80 REM THE SHAPE.
 90 y0=350
    :x0=100
    :inc=80
100 *KEY10 OLD|M RUN|M
110 ON ERROR GOTO 120
120 MODE 7
130 PROCOptions
140 MODE 1
150 GCOL 0,2
    :GCOL 0,129
160 VDU 24,90;340;1150;1000;
170 ON Y GOTO 190 ,290 ,390
180
190 REM RECTANGLES
200
210 REPEAT
220 GCOL 0,128
    :CLG
    :GCOL 0,129
230 X%=3+RND(7)
    :Y%=3+RND(5)
    :O%=0
    :F=1
    :A$="rectangle ="
    :A1$=""
240 PROCparallel
250 PROCdrawgrid
260 PROCtext
270 UNTIL FALSE
280
290 REM PARALLELOGRAMS
300
310 REPEAT
320 GCOL 0,128
    :CLG
    :GCOL 0,129
330 X%=3+RND(7)
    :Y%=3+RND(5)
    :O%=RND(3)
    :F=1
    :A$="parallelogram ="
    :A1$=""
340 PROCparallel
350 PROCdrawgrid
360 PROCtext
370 UNTIL FALSE
380
390 REM TRIANGLES
400
410 REPEAT
420 GCOL 0,128
    :CLG
    :GCOL 0,129
430 X%=3+RND(7)
    :Y%=3+RND(5)
    :O%=RND(X%)
    :F=0.5
    :A$="triangle ="
    :A1$="/ 2"
440 PROCtriangle
450 PROCdrawgrid
460 PROCtext
470 UNTIL FALSE
480 END
490 DEF PROCdrawgrid
500 FOR J=0 TO X%+O%
    :REM VERT. LINES
510 MOVE x0+J*inc,y0
520 PLOT 5,x0+J*inc,y0+Y%*inc
530 NEXT
540 FOR J=0 TO Y%
    :REM HORIZ. LINES
550 MOVE x0,y0+J*inc
560 PLOT 5,x0+(X%+O%)*inc,y0+J*inc
570 NEXT
580 ENDPROC
590 DEF PROCparallel
600 MOVE x0,y0
610 MOVE x0+O%*inc,y0+Y%*inc
620 PLOT 87,x0+(O%+X%)*inc,y0+Y%*inc
630 MOVE x0+X%*inc,y0
640 PLOT 87,x0,y0
650 ENDPROC
660 DEF PROCtriangle
670 MOVE x0,y0
680 MOVE x0+(X%-O%)*inc,y0+Y%*inc
690 PLOT 87,x0+X%*inc,y0
700 ENDPROC
```

Maths listing

From Page 161

```
710 DEF PROCtext
720 PRINT TAB(0,23);"Area of "A$
    " base * height "A1$
730 VDU 28,0,30,39,24
    :CLS
    :Len=LEN (A$)+8
740 PRINT TAB(0,1)"Area of "A$
750 REPEAT
760 INPUT TAB(Len+3,1)""base
770 IF base<>X%
    THEN PROChelp(1)
780 UNTIL base=X%
790 PRINT TAB(Len+8,1)"*"
800 REPEAT
810 INPUT TAB((Len+12),1)""height
820 IF height<>Y%
    THEN PROChelp(2)
830 UNTIL height=Y%
840 PRINT TAB(Len+18,1)A1$
850 REPEAT
860 PRINT TAB(Len-1,2);"=    "
870 INPUT TAB(Len+3,2)""area
880 IF area<>X%*Y%*F
    THEN PROChelp(3)
890 UNTIL area=X%*Y%*F
900 PRINT '"That's right   !"
910 REPEAT
    :PRINT TAB(0,7)"Press any key
     for another go ";
920 Y=GET
    :UNTIL TRUE
930 ENDPROC
940 DEF PROCOptions
950 PRINT TAB(0,3)CHR$ (128);
    CHR$ (157);CHR$ (134);CHR$ (141)
    ;"Options"
960 PRINT TAB(0,4)CHR$ (128);
    CHR$ (157);CHR$ (134);CHR$ (141)
    ;"Options"
970 PRINT TAB(5,7)CHR$ (131);"(1)
      Rectangles"
980 PRINT TAB(5,8)CHR$ (131);"(2)
      Parallelograms"
990 PRINT TAB(5,9)CHR$ (131);"(3)
      Triangles"
1000 VDU 31,4,18,131;
    :PRINT "Choice ?";
1010 REPEAT
    :Y=GET
    :UNTIL Y>48 AND Y<52
1020 Y=Y-48
1030 ENDPROC
1040 DEF PROChelp(E)
1050 IF E=1 OR E=2
    THEN PRINT "Look at the shape
     carefully"
1060 IF E=3 PRINT "Haven't you learnt
     your tables yet  !"
1070 z=INKEY (500)
1080 IF E=1
    THEN PRINT ;TAB(Len+3,1);"
       "
1090 IF E=2
    THEN PRINT ;TAB(Len+12,1);"
       "
1100 z=INKEY (1000)
1110 PRINT TAB(0,2);SPC (78)
1120 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 165.



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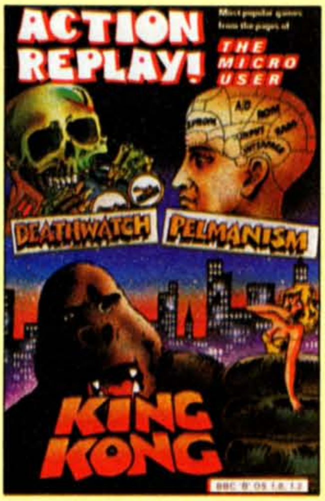
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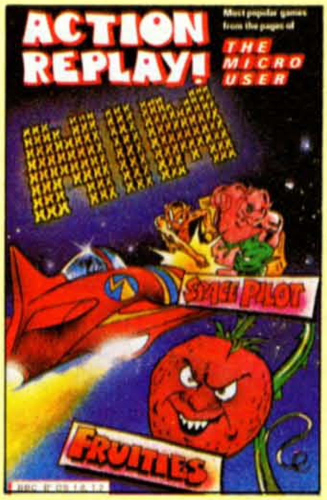
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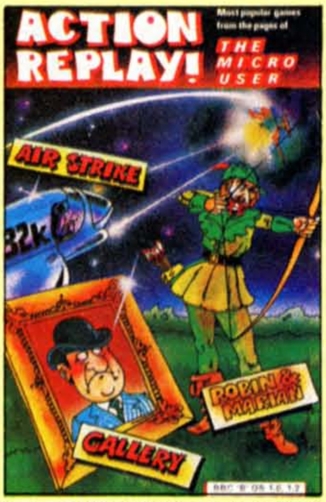
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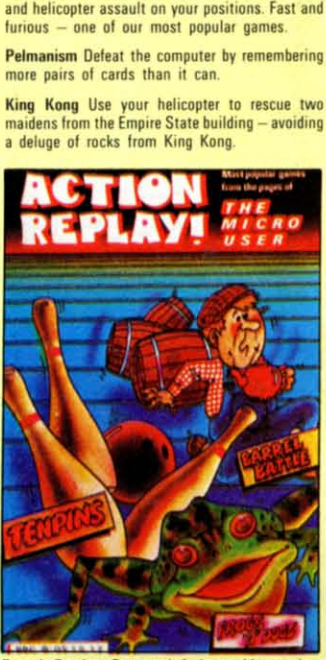
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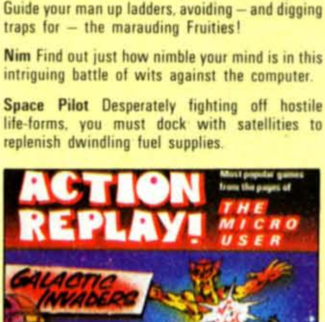
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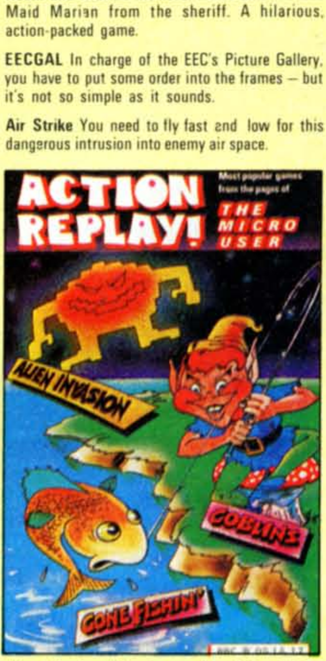
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SEPTEMBER: Robin & Marian, rescue Maid Marian from the Sheriff of Nottingham. **Galactic Invaders,** an exciting arcade game. **DFS Benchmarks,** 14 DFS test programs. **Animation,** new techniques. **Terminal,** connect a BBC Micro to a mainframe.

OCTOBER: Fishing, a compulsive day's angling. **Joykey,** convert programs to joystick. **Pentest** and **Bellringer,** for Micro User lightpens. **Contours,** an educational program. **Link** BBC Micros to each other. **Plus** all the listings from the first Electron User.

NOVEMBER: Goblins, an enchanted journey. **Blackjack,** the casino favourite. **Charge** and **Pendulum,** Body Building Course part 9. **Sideways,** programs in ROMs. **Pendraw,** a light pen sketching program. **Plus** all the programs from the second Electron User.

DECEMBER: Tower, rescue London's treasure. **Santa,** help Father Christmas deliver his presents. **VDU 23,** an invaluable character defining utility. **Paged,** the listing from our paged graphics article. **Plus** all the listings from the third issue of Electron User.

JANUARY 1984: Barrels, an all-action arcade game. **Noteplay,** an entertaining musical utility. **Dump1** and **Dump2,** multitone screen dumps. All the programs from our **Sound, Beginners'** and **Graphics** articles **Plus** 12 programs from the fourth Electron User.

FEBRUARY: Invasion, the classic arcade game. **Frogs,** fun for all the family. **Engvgen,** a logic game. **Balance,** a number learning program. **Key,** single key entry for the BBC Micro **Plus** nine other programs from *The Micro User*.

MARCH: Mazemunch, blockbusting arcade action. **Birthday,** family fun for our anniversary. **Derrick,** number fun for infants. **Pixelpen,** high resolution for lightpens. **Loadtape,** a recovery utility. **Plus** 18 other programs from the pages of *The Micro User*.

APRIL: Microgolf, the simulation. **Eastermaze** and **April Fool,** seasonal games. **Seawall** and **Magic Square,** maths fun. **Filer** and **Album,** a database of sounds. **TRX1, TRX2,** RS243 driver. **Heartrate,** monitor your fitness.

MAY: Dug Dig, asteroid adventures. **Damraider,** naval action. **Envaid,** easy envelopes. **Steppers,** Body Building motor control. **Spiro,** graphics windows. **Adventure,** a trapdoor maze. **Renumber,** program utility. **Bigletter,** large type. **Memory,** RAM efficiency.

JUNE: Roadracer, 3D driving action. **Quadline,** four-in-a-line logic game. **Monitorone, Monitortwo,** machine code debugging routine. **Toolkitone, Toolkittwo,** 8271 disc controller explored. **Areas,** easy maths. **Spell,** spelling education. **Spokes,** simple, beautiful graphics.

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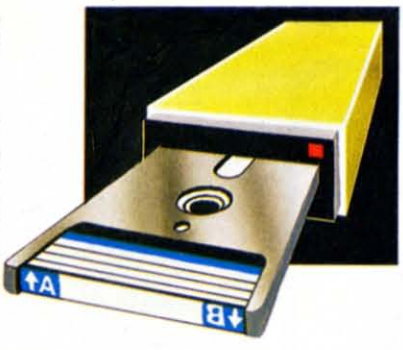

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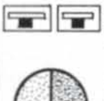

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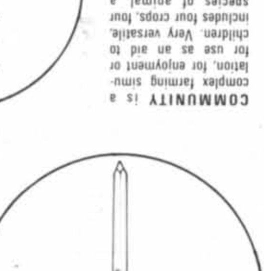

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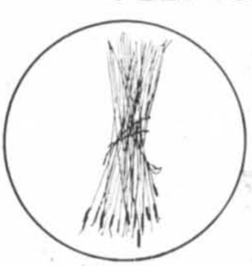

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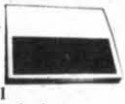

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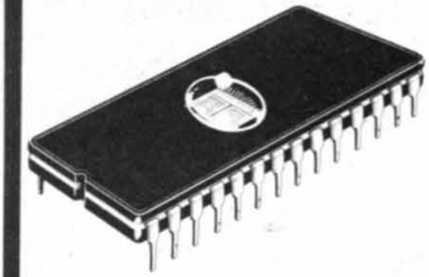

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***OFF**	Cancel enhanced error handling.
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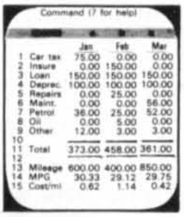

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10
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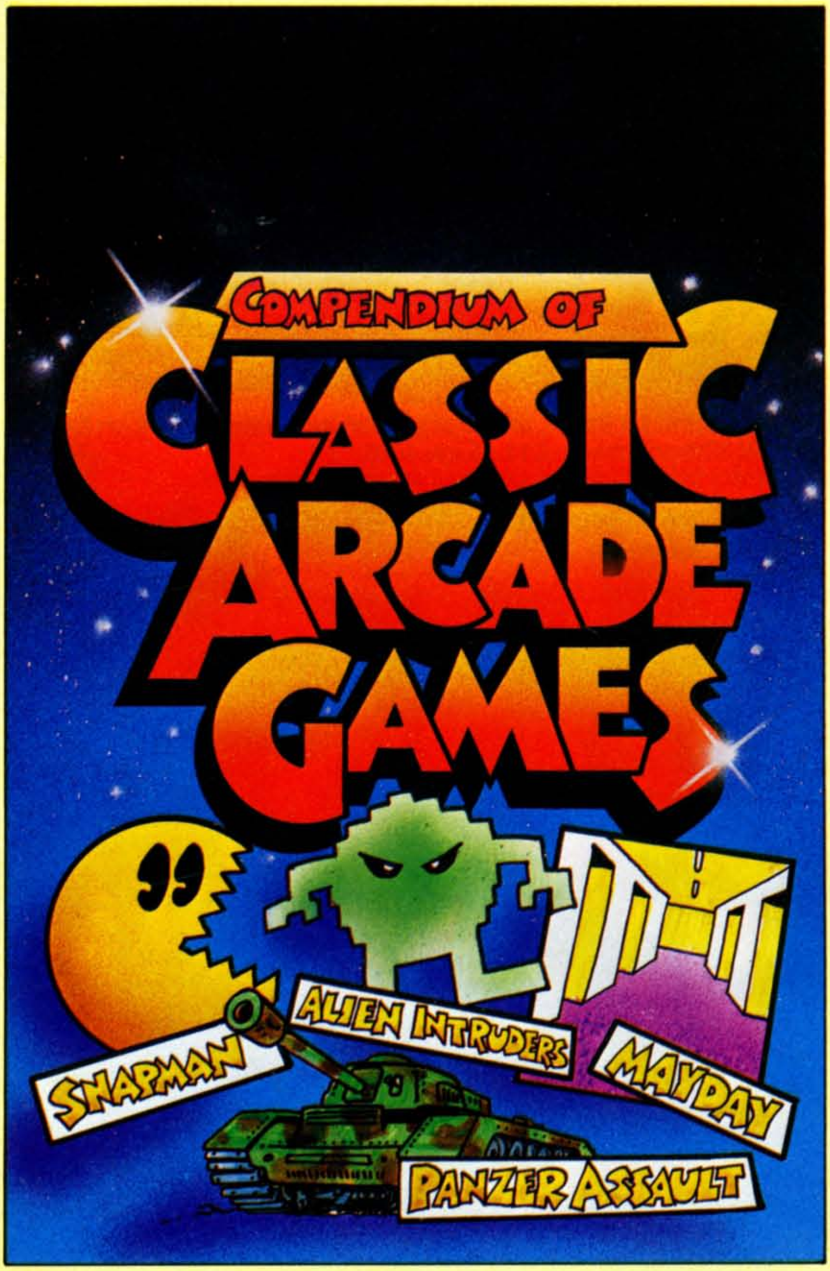

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MICROMAIL

Full to bustin' with 16 ROMs

SIDEWAYS ROM expansion boards have been available now for a few months and I should like to know whether 16 ROM chips is the absolute maximum the BBC Micro can support.

With all the interesting new ROM chips appearing on the market almost daily now, I can foresee a day not so far hence when the expansion board will run out of slots – or are we in for a ROM expansion board expansion board?

Faced with a ROM space problem, can we copy ROM-based material to disc? I seem to remember reading that this can be done with a sideways RAM expansion board on the market.

Can the latter be fitted where there is already a ROM expansion board, I wonder?

The poor Beeb will soon be bursting at its seams! – **S.M. Hopkinson, Croydon.**

● 16 is the maximum you can use, as it's governed by the decoder used and the way the OS expects things to be set up.

Solidisk do allow you to transfer your ROM-based software to disc, but there might be some physical problems as far as space is concerned with your current sideways board.

In a rather more complicated fashion, you could also use the ROM boards that allow on-board RAM for transferring files from disc.

Crammed solid

I'VE just completed listing "Deathwatch" game from your mag and I must congratulate you on a good choice, and having to use quick reactions and good skill to stay alive.

The only trouble is with the length of the gun barrel and the speed in which it moves.

Firstly when started the barrel is at full length, but the more you move left or right it shortens. This I can understand, so it can fire at sharp angles, but the barrel becomes so small (¼in) it is very hard to guess the right angle (only by trial and error).

Can it be lengthened and can it also be speeded up in turning to fire?

Can you also challenge yourself or any buffs to write in Deathwatch planes to help the defence by destroying tanks occasionally as do the helicopters to the guns and to make it more interesting if possible, have tanks attacking the invaders automatically without needing controls. – **Simon Turner, Chesterfield, Derbyshire.**

● We can't imagine how anyone could cram anything more into Deathwatch – but are sure some of our readers would welcome the challenge!

Getting at the B side

WITH software becoming available on 3in discs made to suit the AMS layout, users of other makes of drive might like to know that I have successfully used an Opus two-sided drive to read both sides of an AMS disc, and hence to make an Opus version of the original.

There is no problem with A sides of discs – they look alike. To get at a B side, the Opus drive must be persuaded to take the AMS disc B side up.

To do this, cover the square notch neatly with sellotape and make sure it sits properly in the drive.

Since there is a risk of tape pushing the disc slightly out of its correct position and causing damage, it is best to regard this as a temporary trick for transferring files to another disc for permanent use rather than as a regular method for using the disc.

In any case, if you have read/write heads for both sides of discs you don't want to be turning them over all the time. – **Hylton Boothroyd, Gaydon, Warwick.**

Wordwise worry

AS one of your publication's most avid readers, and this being the first time I have had cause to write to you, may I start by saying how much I enjoy each issue.

If nothing else the advice and informed reviews of both hardware and software have saved me money and the various articles on programming have taught me a great deal.

Now to the point of my letter. I have a BBC model B with OS 1.20. It is fitted with Wordwise 1.10 and your March issue was the final prompt I needed to upgrade to discs.

I bought an Acorn DFS 0.90 upgrade kit, Disc Doctor, and a Teac 55F double sided 40/80 switchable drive.

Using Mike Cook's article in the January 1984 issue of The Micro User as a guide (the instructions with the DFS were awful) I installed everything and switched on. All seemed well until it came to using Wordwise.

Whenever I tried to save and then reload a long file of say 200 words or more I got "Disc fault 08 at" followed by two sector numbers.

Thinking it may be something to do with Wordwise I telephoned Computer Concepts. They said it was a question of incompatibility between the way DFS 0.90 handles random access files with some drives including the Teac.

When I telephoned Acorn they said they were not aware of any problem and that it should work correctly. It doesn't.

I returned to the dealer – Twillstar Computers who, I must say, couldn't have been more helpful. Nothing they tried worked.

Furthermore they found other BBC machines in their stock fitted with Wordwise and DFS 0.90 that had the same fault.

In the end they managed to find a DFS 0.98 and this solved the problem. (I thank heavens I didn't go to a department store to buy the upgrade).

Since the word processing packages advertised in your pages often include Wordwise and Teac drives, you may consider drawing your readers' attention to this potential problem.

If Computer Concepts knew what I was talking about immediately it must be more than just a rare event. – **M.J. Waldren, Kenton, Middlesex.**

DFS dilemma

NOW that the 6502 second processor for the BBC has been released we find that to use it you must replace the existing DFS with the new one supplied.

This contains a piece of code which must be transferred across the Tube before the processor will work.

I suppose this means that all those people (myself included) who've been using the alternative DFSs, such as Watford Electronic's, will now either have to hope that Watford produce a compatible ROM or else change all those 62 file discs to 31 files.

One hell of a task if you've got

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any number and leaving you with a whole load of half empty discs.

This shouldn't have happened. So far as I know the Watford DFS only uses legal Acorn approved OS calls, so there was no reason to suspect when I bought the thing that it wouldn't work with a second processor.

After all, Acorn have been stressing all along that as long as the legal calls are used then everything would be all right.

The blame for this lies at Acorn's door – are they simply peeved that people have been using the alternatives or do they have a better reason?

I for one would be very interested to hear what they've got to say. Yours most peeved. – **Pete Gaunt, London NW10.**

Let the ASA act

LIKE several of your readers, I too have been unable, either to get the issues of Laserbug for which I have paid or any response to letters.

May I suggest a course of action to those similarly placed which might ensure that no one else suffers in future.

If the attention of the Advertising Standards Authority is drawn to the circumstances I am sure they would investigate and take appropriate action if satisfied that the complaint was justified.

The Authority publishes an excellent little booklet which describes exactly how to make a complaint and a copy can usually be found in the public library or the local Citizen's Advice Bureau. – **J.A. Brook, Norton, Worcs.**

Another victim

MR Derbyshire, whose letter published in the April issue of The Micro User, is not the only victim of Laserbug.

I too sent a cheque on December 28 1983 and waited until February 14 1984 with still no reply.

I then sent them a letter asking them to at least acknowledge my £12 cheque which by my bank statement appears to have been transferred to their account.

Not having the decency even to do this, I was naturally angry, so I wrote to the magazine in which they advertise.

Argus Publications made efforts but to no avail. Argus suggested that I write to the Advertising Standards Authority which I did. Even their efforts failed.

And so I write to you asking you, as Mr Derbyshire has done, to put other potential "Subscribers" to Lazerbug on the alert. – **D.V. Elliot, Slough, Berks.**

Seawall mod

I AM one of the multitude who frequently think of writing to a magazine and then don't bother; but as its Friday 13th and my sub is due, here goes.

First, one more message of glowing praise to add to the great pile which you already have.

Second, thanks to Brian Spencer's letter about Enhanced Blackjack – I have been intending to do this mod ever since I ran the original program but I have never found the time – not that much time was needed!

I am not sufficiently musical to suggest an improvement to the Fiddler theme.

Third, a similar simple mod is necessary for the Seawall program from the April issue – this I have done while I was debugging my input.

There are two problems – when Ben is building the wall he turns his back on the wall before the final movement of placing the brick on the top.

Also when he catches the octopus he changes colour – and so does the wall since both are yellow to start with. The result is that there is nothing holding the sea back.

The second problem is solved by changing the bricks to red (the obvious choice) and the wall remains visible all the time. The first problem is handled by printing a "man right" at the end of the stacking routine.

A third change can avoid Ben turning his back on the wall after he has five bricks and the game is nearly over. He can immediately jump in to catch the octopus – **G.S. Bainbridg, Yarm, Cleveland.**

```
  420 COLOUR1
  534 COLOUR3
  535 PRINTTAB(12,15)CHR$22
8TAB(12,16)CHR$230TAB(12,17
)CHR$233
  536 E=INKEY(50)
  540 IF stack%<5 PROCmanre
ady(12,15)
  885 COLOUR1:PRINTTAB(X%+1
,Y%)CHR$229TAB(X%+1,Y%+1)CH
R$231
  935 COLOUR1:PRINTTAB(X%+1
,Y%)CHR$229TAB(X%+1,Y%+1)CH
R$231
 1135 COLOUR1
 1220 COLOUR1:REM rest of l
ine unaltered
>
```

JUST FOOLING . .

I WAS intrigued by the article on the BBC 2 Micro, an exciting sounding machine with its many attributes including the 32 bit Z90 and its revolutionary input medium.

As an ex-telephone engineer I was delighted to read that British Telecom approve the new RS632 port, though the D to D interface puzzled me a little and I found it hard to en-Visi-age the 1MHz coach.

Notwithstanding, I read on, absorbed.

Only when I reached the software package "Visi-Bull" did I stop to check the front cover. Yes! April issue!

Well done. I liked the decoy April Fools Day program in Micromail.

How many others spotted it? I add my thanks to the thousands before me for a brill mag. (if you'll pardon the vernacular) – **A.R. Biggs, Rugeley, Staffs.**

* * *

YOUR article on the new BBC 2 model "supercomp" (April issue) was warmly welcomed by all at Cuckooland Computers. We would like to acquaint you of our work on the new machine. We are shortly to market two further software packages for the new machine known as en_VIS_age and de_VIS_or.

en_VIS_age is an entirely new product which will make us a mint. All the operator needs to do is envisage which type of system he/she wants, tell the machine and hit Return. The BBC 2 will set itself up automatically.

en_VIS_age is obviously the last word in emulation and will allow the BBC 2 to emulate the operation of several of the more common mainframes, including the CRAY 2 and the more common IBM machines.

de_VIS_or is a CAD program that allows virtually any item to be designed and built by the computer. In trials this has been so successful that, using its CAD facilities the computer recently learned to walk, and last week took over the boss's job.

All of this new software will be sold at the usual competitive rates Cuckooland is famous for (£25,000 for the C15 cassette version) and with such low prices we do not anticipate any piracy problems. – **M. Lumsden (Chief Cuckoo), Newcastle-upon-Tyne.**

Keyboard costs

I AM an owner of a BBC B fitted with an Acorn DFS. I have had this machine for nearly three

● ***Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

years, and while the micro was still under guarantee it was necessary that a new keyboard should be fitted, due to the previous one having a "technical hitch".

About two weeks ago the new keyboard, which had lasted for two years, went severely wrong. The Return button, the Copy and Delete button, as well as the cursor up button all failed to function.

This prompted me to take the machine to my local dealer and thus get it fixed. After a week, the machine was ready, and accompanied by my mother we went to get it back.

The employee of the shop/company brought my BBC Micro back to me, and stuck on it was the bill. I expected the cost to be around £10-£18, but instead, much to my dismay and horror the bill came to a ludicrously high figure of £46.22.

Included in the price was VAT (£6), labour (£18), and the remainder was the price of the keyboard itself.

After being startled by this amount the man told me that the keyboard was guaranteed for three months. My question is, am I being done by a ridiculously expensive dealer or is this the regular price one must pay when one buys such a brilliant and "reliable" machine? – **Graeme M. Black, Stanmore, Middlesex.**

● If it really was the keyboard it would have taken all of 10 minutes to substitute one, so £18 seems ludicrous for labour. However, doing our sums, this leaves £22 for a complete keyboard, which seems good value.

Avoid that decimal tedium

AS a newcomer to BBC Basic may I congratulate you on your interesting and highly informative series on graphics.

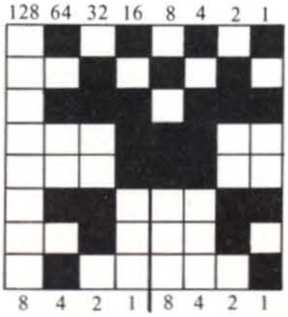
It certainly helped in areas where the User Guide tends to leave one floundering and frustrated. Particularly beneficial was your article on user-defined characters.

I do however find it rather tedious working out the decimal bit pattern of each byte from a possible 255 alternatives (0-255).

Anyone with the slightest clue about hex may find the system I use much simpler.

Instead of describing the whole byte as a decimal number, I find it simpler to split the byte into two halves and describe each half in hex.

Because there are only 15 alternative ways of expressing each half byte (HEX 0-F), the character is much simpler and quicker to create. – **A. Sergeant, Newark, Notts.**



Decimal	Hex	
85	5	5
42	2	A
119	7	7
28	1	C
28	1	C
99	6	3
34	2	2
65	4	1

Phasing out GOTO

I HAVE been following with interest your correspondence on structured programming, and without adding to the mudslinging, I would like to offer my own experiences.

I started programming on a ZX81 about two and a half years ago and then graduated to a Microsoft machine (an Osborne I) before acquiring a BBC Micro in September.

For a long time my programs were of a typically spaghetti-like construction, but I eventually learned to make fairly effective use of GOSUBs and achieved some sort of structure.

Even so, much paperwork was needed to make the programs go properly, and debugging was a real headache.

Since owning the BBC, however, I have been gradually coming to terms with DEFPROC and REPEAT . . . UNTIL, steadily reducing the number of GOTOs in my programs.

Finally I took the plunge and swore off GOTOs entirely. The reason for this was not because some guru said I should, but simply because the less GOTOs I used, the easier programming got.

I now find I can compose almost entirely on the machine (I am as lazy as the next person) and still achieve a well-structured program, as I am effectively forced to use a top-down approach.

Testing and debugging are a doddle, alterations are simplicity itself. And my programming time has been reduced by about 75 per cent.

Included in my renuciation are the ON . . . GOTO and ON . . . GOSUB constructs. This is not pedantry:

```
100 IF choice = 1 THEN
    PROCa
110 IF choice = 2 THEN
    PROCb
etc.
```

is infinitely easier to follow than,

```
100 ON choice GOSUB
1000,1100, etc.
```

and well worth the extra typing. – **John F. Armitage, Todmorden, Lancs.**

A bug still lurks

I HAVE discovered an interesting bug for the BBC Micro, O.S. 1.2 and Basic II (it may work on earlier operating systems).

If the operator types in; 10G.10:G.10: . . . and so on until the "line full" beep sounds and then presses Return the computer starts to emit weird noises, which then ends in a three part chord!

This chord continues, without the operator being able to escape, leaving a flashing cursor on the screen.

If the Break key is pressed and the program is OLDed there is nothing there!

This must be one of a few bugs in the O.S. 1.2. It only appears to work with the G. (shorthand for GOTO) statement, and I would be interested to know if any other statements do it.

Although this bug will not drastically affect programming on the Beeb, it is interesting to know that Acorn still haven't got it quite right! – **Ian Hassall, Leeds, Yorks.**

Digging Down Under

FIRSTLY congratulations on such a splendid and helpful magazine. Even though my copies arrive "down under" a couple of months late they are none the less an excellent inspiration to beginners like me.

I took Mr Lloyd's advice (page 110 of the September 1983 issue) and did a bit of digging in some other Acornsoft games.

Using the method he describes

→

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one can increase lives by changing address values, shown to the number of lives required.

*Addresses are &FDD for Snapper, &117B for Rocket Raid and &1F04 for Monsters. You have to change Monsters from *RUN to *LOAD to get at the address and then call &E02 to get it running.*

The only trouble with all three games is you won't know how many lives you have left unless you keep count. – **Jeff Marchant, Alexandra, New Zealand.**

Crackles traced

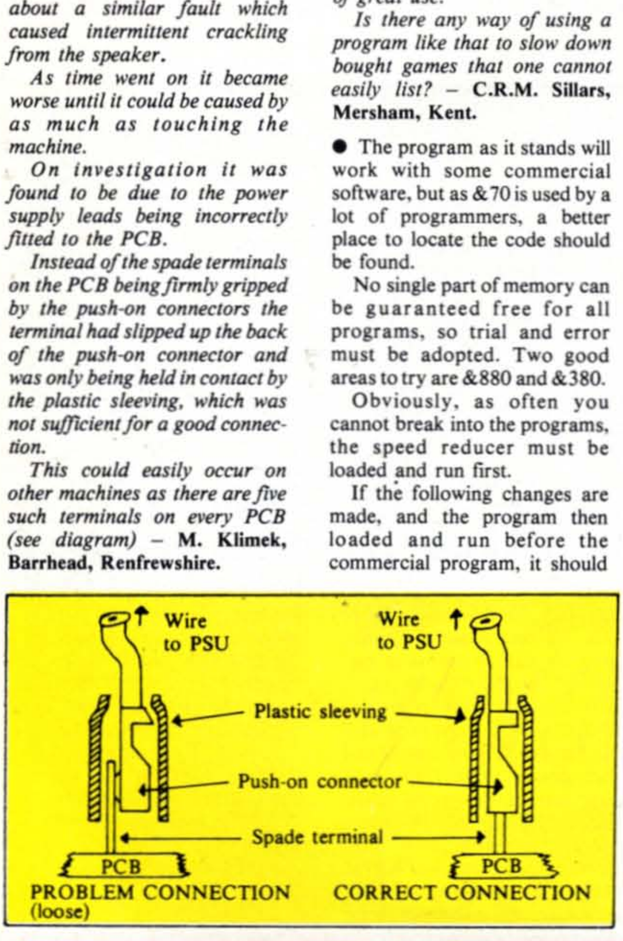
AFTER reading the letter in last month's issue about a socket snag I felt I should inform you about a similar fault which caused intermittent crackling from the speaker.

As time went on it became worse until it could be caused by as much as touching the machine.

On investigation it was found to be due to the power supply leads being incorrectly fitted to the PCB.

Instead of the spade terminals on the PCB being firmly gripped by the push-on connectors the terminal had slipped up the back of the push-on connector and was only being held in contact by the plastic sleeving, which was not sufficient for a good connection.

This could easily occur on other machines as there are five such terminals on every PCB (see diagram) – **M. Klimek, Barrhead, Renfrewshire.**



Speed reduction

I THINK Barrel Battle is one of the best games I have typed in. I have two children, who of course are always much better than I am at the games, but this one I can even manage to play for a while without immediately losing a life! The children think it is really great too.

However having typed it in and checked it several times for mistakes, especially on screen 3 and with three barrels, the top and or bottom of the ladders sometimes disappear, making it impossible for one to continue.

Maybe this is supposed to happen, but I hope not.

I found the slow down program in the December issue of great use.

Is there any way of using a program like that to slow down bought games that one cannot easily list? – **C.R.M. Sillars, Mersham, Kent.**

● The program as it stands will work with some commercial software, but as &70 is used by a lot of programmers, a better place to locate the code should be found.

No single part of memory can be guaranteed free for all programs, so trial and error must be adopted. Two good areas to try are &880 and &380.

Obviously, as often you cannot break into the programs, the speed reducer must be loaded and run first.

If the following changes are made, and the program then loaded and run before the commercial program, it should work in a lot of cases.

I have tried it with Atomic Protector, from Optima, and achieved my best score yet.

The changes required are to delete lines 10-40 and change or insert the following lines:

```
 50 MODE7
 60 R%=3
 70 P%=&880
 75 S%=P%
120 LDX#40:LDY#R%
181 .CHANGE SEI
182 LDA#S%DIV256
183 STA &205
184 LDA#S%MOD256
185 STA &204
186 CLI
187 RTS
200 CALL CHANGE
```

Note that R% (see line 60) is the reduction factor, but tapes do not seem to load if this is higher than 3. It can be put up to 6 if you are using disc.

P% (see line 70) is the position that the code will locate. If &880 does not work, try other areas.

P. Davidson

Commas caper

I HAVE always been under the impression that inverted commas could not be placed inside inverted commas within a PRINT statement, the reason being they would always cause an error. Yet this is not so.

While playing around with my BBC Micro I found to my amazement and quite by accident that they can be included inside themselves.

PRINT " " " gives an error missing "

PRINT " "HELLO" " gives us "No such variable".

The trick is to put them in pairs, that is PRINT " """ " will print " on the screen. Print " """HELLO""" " will print "HELLO".

This may be helpful to any reader who is writing an educational program on BBC Basic and needs to get the little beasties on the screen. – **Cyril G.H. Flanaghan, Nuneaton, Warks.**

More games for the handicapped

THERE are lots of excellent arcade type games around which rely on manual dexterity on the keyboard, but I have been working with BBC Micros with a group of handicapped young people, who find most games are too fast for them.

They love your Frogs n' Dogs because they can manage to hit the space bar at the appropriate moment, and they can play Skittles from your Christmas Crackers tape.

Could you list any other programs which would operate on the space bar alone, or where keyboard entry is fairly simple and not dependent on speed?

Please will Micro User help to brighten the lives of accident victims and other handicapped people? – **Mrs Margaret Jones, Leeds, Yorks.**

● An excellent idea – can anybody out there invent or suggest any "single key" games for our less fortunate readers?

Transfer charges

I WAS interested to read of Acornsoft's action against PCW and their offer to transfer tapes to disc – for only half price.

Personally, I have original Acornsoft tapes for several games and I am quite prepared to reward the superior skills of the man who wrote Sphinx Adventure or whatever.

But I have paid him, and also paid the enormous markup from manufacturer to distributor to dealer.

Now I would like to put them onto disc, but am not prepared to *pay again.*

Anyone connected with a computer club will know how much copying goes on.

Acornsoft's scheme will not curb these activities, rather it will force others along the same path.

After the machine delays, the 0.1 OS saga, DFS delays, second processor delays, it would be a friendly gesture if this proposed charge were withdrawn for those who already have original tapes. – **R.L. Sadler, Brentwood, Essex.**

Towards progress

IT was with a mixture of delighted amusement and depressing sadness that I read Richard Grant's response to my letter in your April issue.

Amusement because it was precisely the analogy he used to contradict my argument that prompted my letter to you.

I had just received a second communication from the manufacturers of my year old car asking me to visit a dealer for checks and part replacement.

Sadness because Richard confuses the correction of design faults with technological progress.

We are, after all, talking of products which reach the market before all the faults – sorry bugs – have been eliminated.

I am all for **real** *progress and will be first in line for the Mark 2 model.*

However if computer enthusiasts persist in confusing the correction of faults with progress it will be a long time before manufacturers behave responsibly towards we consumers. – **R.D. Jackson, Sevenoaks, Kent.**

Instant diagnosis of faults

*IN your March feature "Year of the Disc" your various contributors mention that the *ACCESS L command will not protect the user against inadvertent formatting.*

The utility disc supplied by Oakleaf Computers has an "Intelligent Formatter" which not only refuses to format a disc containing locked files, but also checks whether or not a disc is formatted, and if it is it displays the catalogue of the disc, and asks if you wish to destroy the files.

As I discovered, the formatter and verifier contain diagnostics, which instead of displaying the usual disc or drive fault message, also gives a diagnosis of the fault, and suggests a cure.

In my case it was a bent chip lead, which I fixed in two minutes, but which would have cost me £10 or so had I returned it to a dealer.

I understand that Oakleaf do have arrangements to supply the utility disc to people who don't have their drives. – **M.S. Chuda, Wigmore, Kent.**

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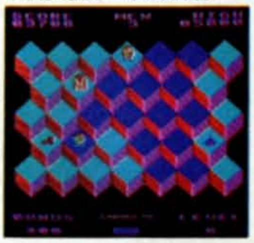

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```
LOAD "FROG2"
PAGE=&E00
LIST
```

– **Mrs P.M. Bevin.**

Obsolete tapes

I AM in the same unfortunate position as Mr Palmer (Jan 1984 issue of The Micro User). I recently bought a dual disc drive and now find that most of my bought taped programs cannot be transferred to disc for one (or both) of two reasons:

- *There is an irritating and awkward shift of memory which means that long programs (which are just the sort which benefit from discs) often give "No room" and also means that machine code may not load in the correct place.*
- *Programs are often protected which means that it is impossible to copy them without corrupting them.*

I have spent over a week now trying to transfer one particular program to disc without success, and am quite disgusted about this.

Some of my favourite programs are now dead ducks because I am not prepared to wait for them to boot from tape if I have a disc which is about one hundred times faster.

It has got to be recognised that tapes are rapidly becoming obsolete even for the home user. – **Glyn D. Williams, Bala, Gwynedd.**

Costly discs

I NOTE the letter in the January Micromail from Neil Palmer, of Bath.

As I now have a disc drive for my BBC I am determined to buy only programs on disc to avoid the time wasting transfering from tape to disc.

It seems however that a new racket has grown up. The price mark-up for the same program on tape to disc ranges from one example of take your pick to a premium of £4, with most charging £2 to £3.

As bulk discs probably cost £1 and you advertise then at £1.40 there is no justification for a mark-up of over £1. – **Ralph C. Taylor, Penrhyndeudrafth, Gwynedd.**

Thanks!

WE thank you for writing us our computer game idea Frogs/'n' Dogs. We have played it and we think it is the best game ever.

I have taken it to school and Mr Rouce spoke about it in assembly. We thank you a lot. – **Sharon King and Paul King, Buckden, Cambs.**

And finally, with tongue firmly in cheek . . .

When the rogues have you taped . .

Dear Trev,

Why is it always me? What is this gift I have for finding the only uneven slab on the pavement? Why do I hold a fascination for pigeons? And why does fate, in the form of Andrea, keep picking on me?

I got home the other evening to find a message stuck to my micro's TV screen. "Having tea at Deidre's. You've been invited to the Romchester Rogues tonight, 7 o'clock in the Ram and Buffer. We'll see you there".

Well you know me and clubs, I hate them. The Romchester Rogues are a bunch of micro freaks who meet every Wednesday to criticise each other's programs and rip off software.

In fact, that's how they got their name. They were originally the Romchester ROG (Rip Off Group) but became the Rogues on the advice of their solicitor.

I'd been to one of their early meetings but hadn't liked it much. I spent half the time tripping over wires connecting cassette recorders. I don't think I saw a single bit (no pun intended) of programming all evening.

Still, for some reason I'd been invited and I was going. Besides, Andrea had swiped the aerial lead from my Beeb, so I had no choice.

The first thing that happened as I stepped in the door was Clive (of "Not another GOTO" fame) grabbing my shoulder. "Good of you to come at such short notice. You're on in two minutes. What's your subject?"

"Subject?" I squeaked, suddenly realising that A. had "forgotten" to tell me that I'd been invited to speak.

"Yes, your subject. All the lads have seen you in the paper and we recorded your radio show and play it at the end of meetings for a laugh. They're dying to hear you live".

With that he dragged me onto the platform in front of the multitudes. Well, they weren't actually multitudes, more like 50 of them, but they were 50 too many.

"Ladies and gentleman. We all know Bob, or at least we've heard of him. He's now here to talk to us about . . . er", he looked at me expectantly.

"The BBC Micro", I squeaked and heard a gasp of mock astonishment from A. who was sitting next to Deidre in the front row.

Clive departed from the plinth and left me alone in front of them. Silence descended and all that could be heard was the clicking of Andrea's knitting needles and the soft whirr of the reel-to-reel copiers.

I shall draw a veil over the next 20 minutes except to say that they were the most humiliating in my life. I ran out of things to say in two minutes and foolishly asked if there were any questions.

If I'd have noticed my nasty nephew Nigel lurking at the back I wouldn't have been so stupid. As it was he asked me some of the most technical questions I'd ever heard. Even Clive looked puzzled by some of them.

A. later told me that Nigel had a couple of friends outside the hall with all the manuals on the Beeb. They kept feeding him awkward questions to ask me. I got so confused with all this that by the end I even apologised personally for the fact that the Electron has no Mode 7.

Eventually Clive got up on the platform and, with the furtive air of someone involved in a mercy killing, brought the proceedings to an end.

I was amazed at the response. The applause was tremendous, there was even cheering. Some of the club members came forward to wring my hand in thanks, tears in their eyes. I was thinking that maybe I'd done better than I imagined until I heard Clive's parting words.

"Good man", he cried enthusiastically, "you pitched it just right. Everyone likes to think they know more than the bloke giving the talk and you had them all believing that".

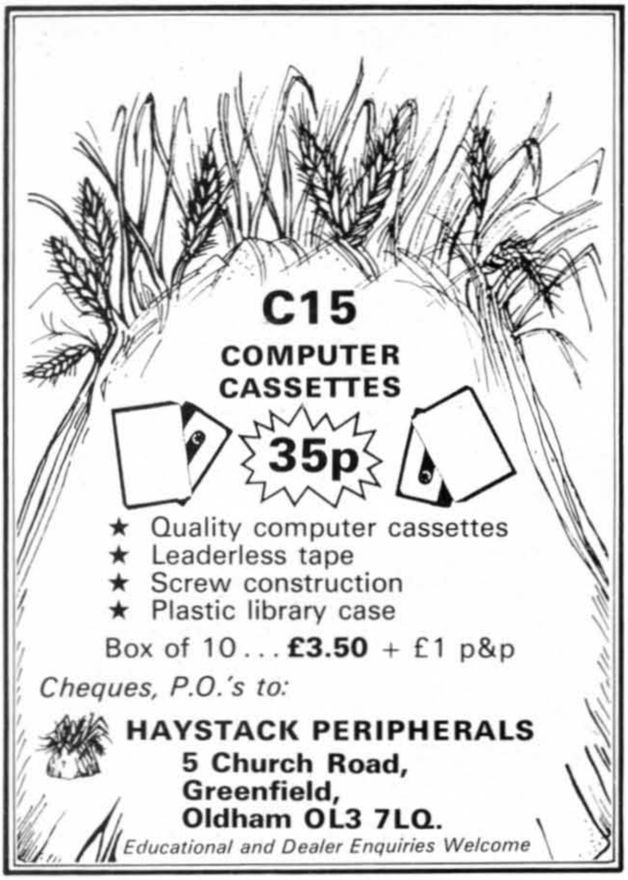
Dazed, I muttered that I couldn't remember quite what I'd said (which might be a good thing). "Don't worry", cried Clive, "the lads have got it all on tape. We'll sell you a copy, cheap".

With that I went downstairs to the bar and imbibed the drinks that the laughing Rogues were keen to buy me. Then I staggered home.

I still can't use my micro. A. won't give me the aerial lead back. She's afraid of what I might do.

Yours despondently,

Bob



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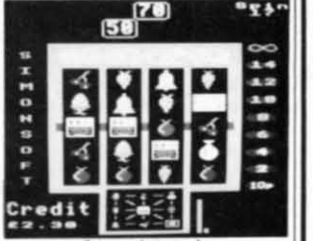

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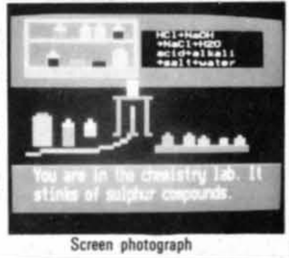

HCl+NaOH
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acid+alkali
→salt+water

You are in the chemistry lab. It stinks of sulphur compounds.

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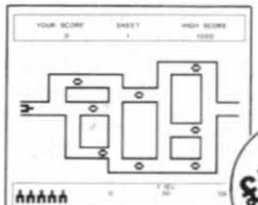

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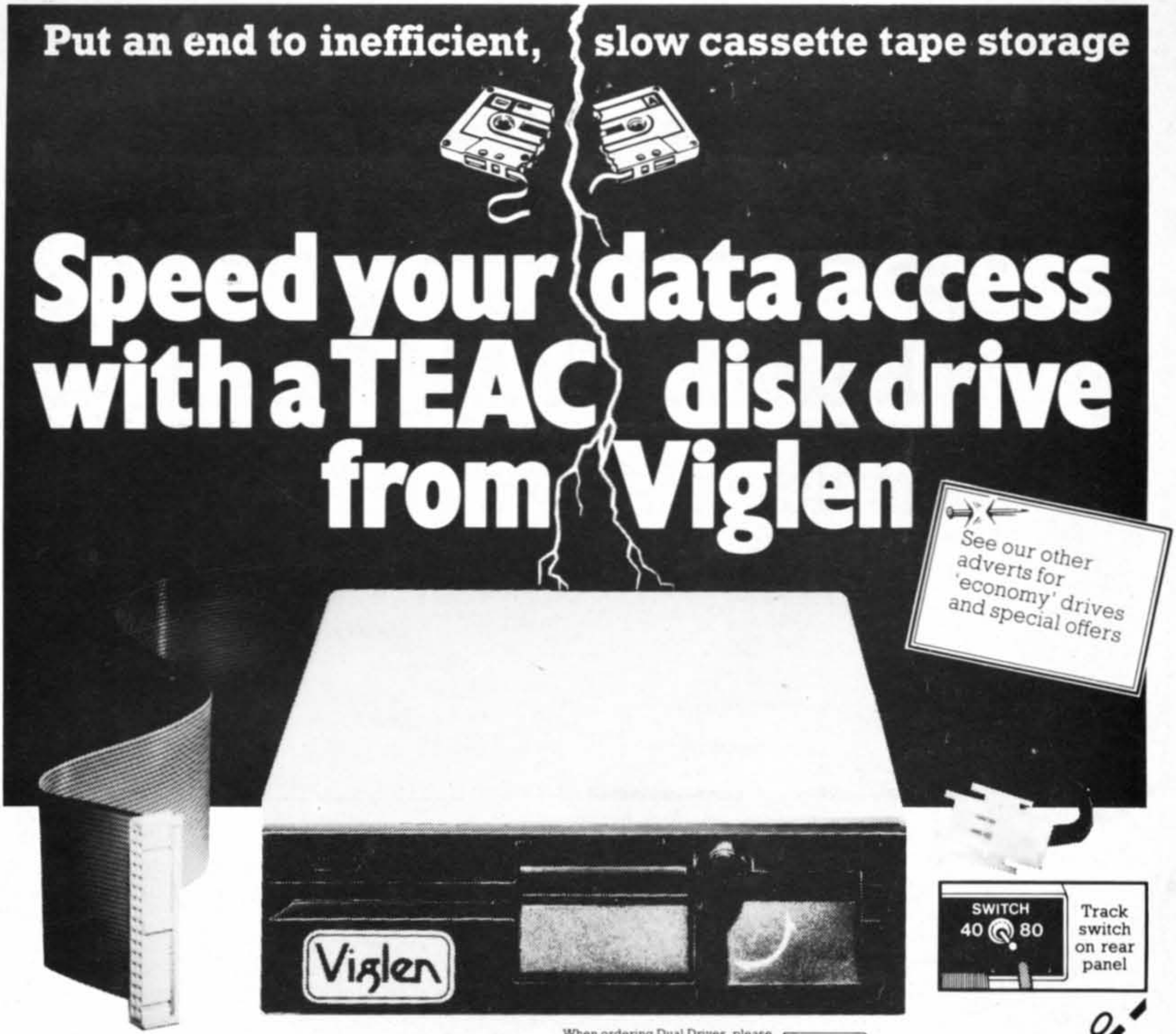
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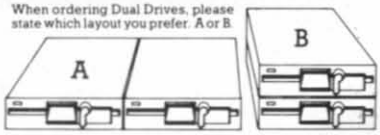

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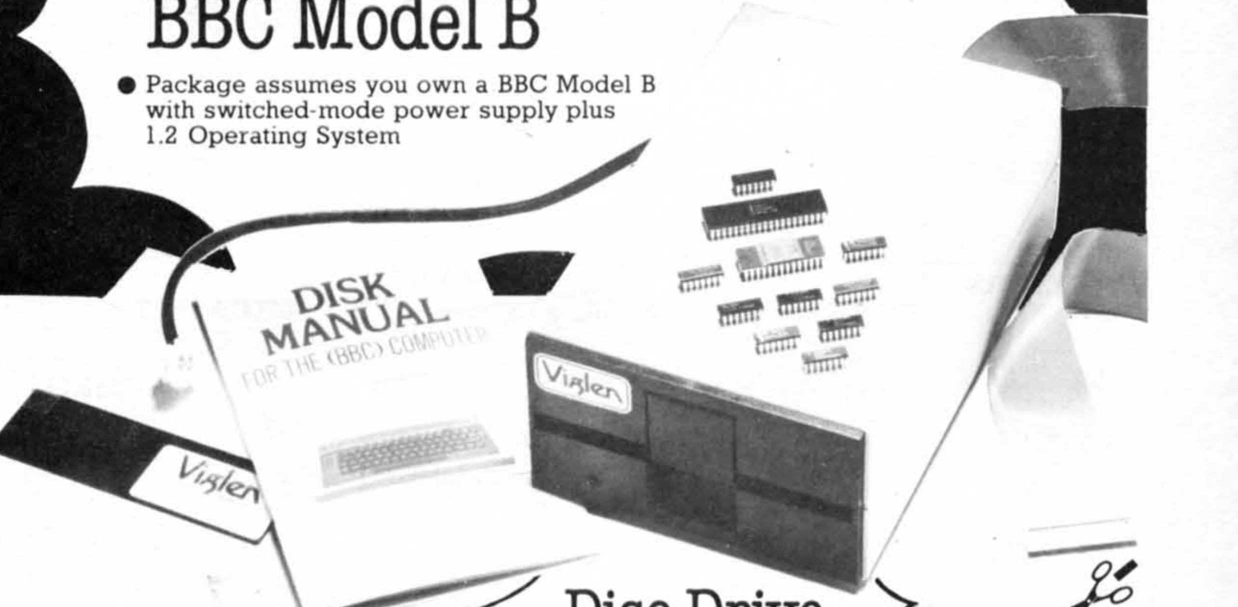

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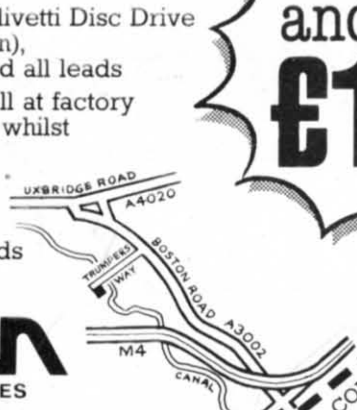

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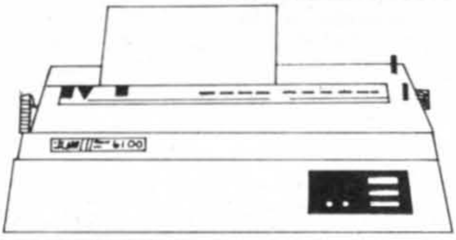

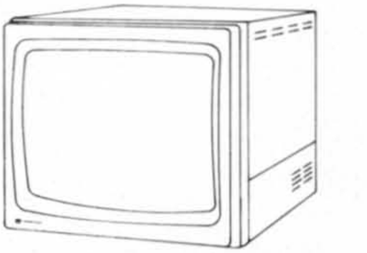

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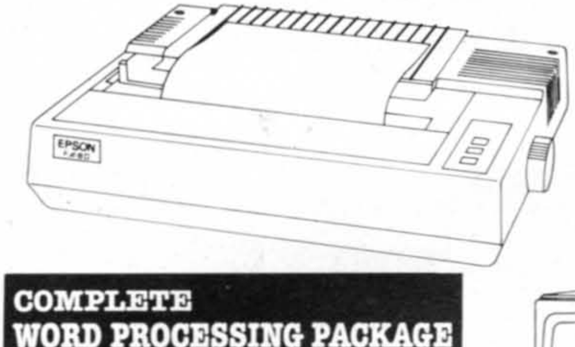

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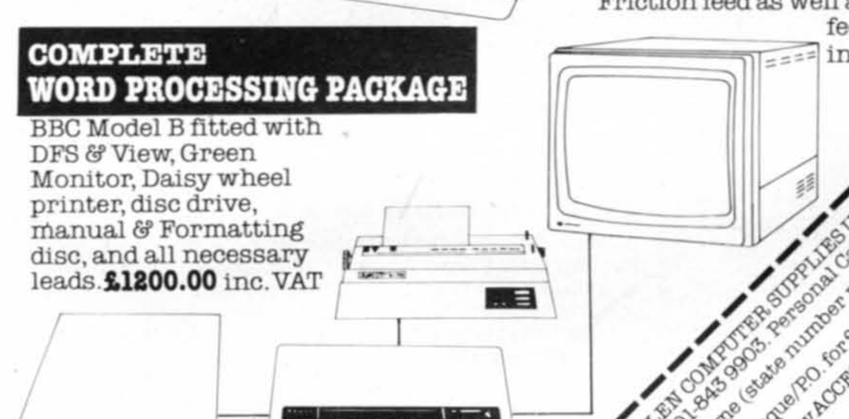

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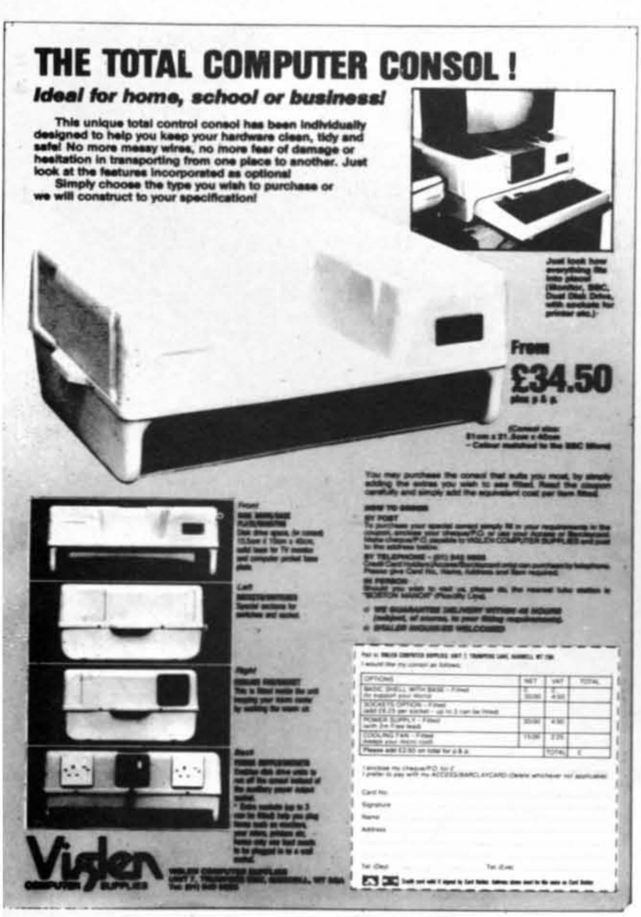

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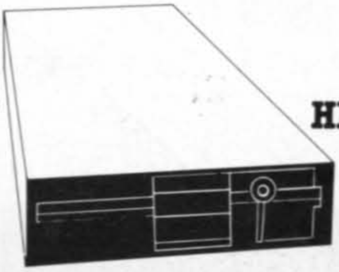

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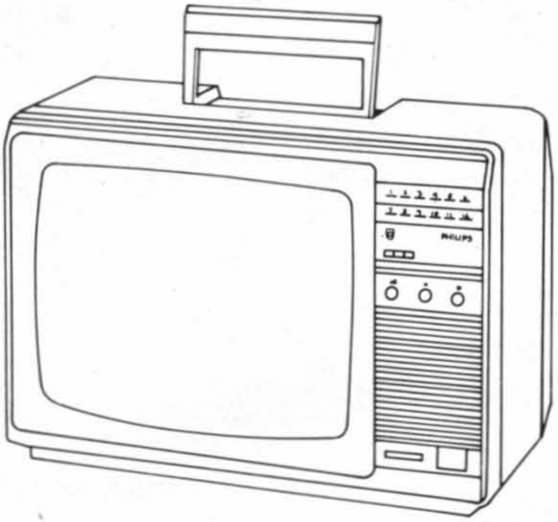

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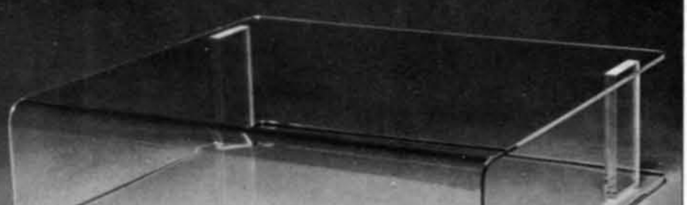

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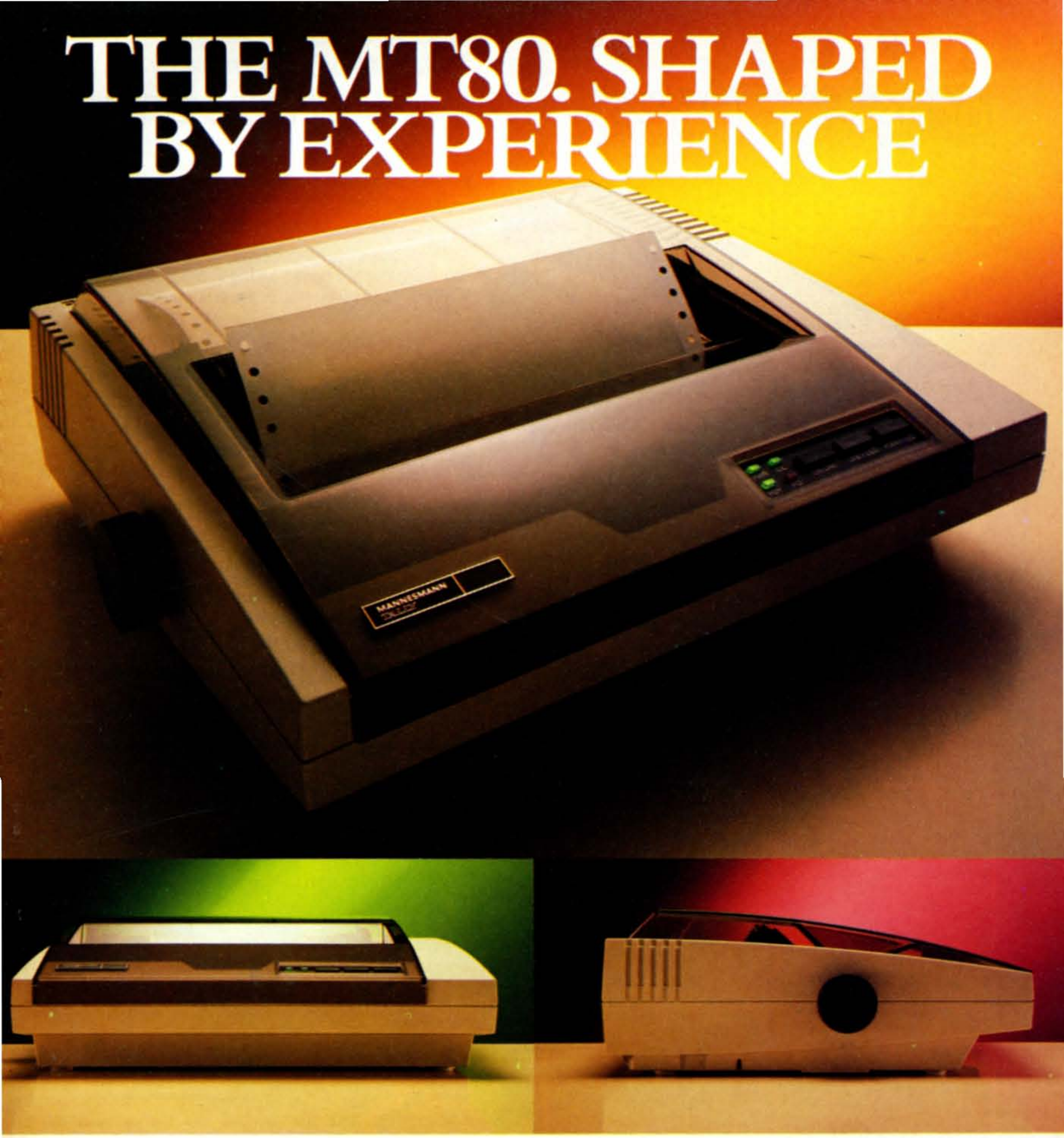

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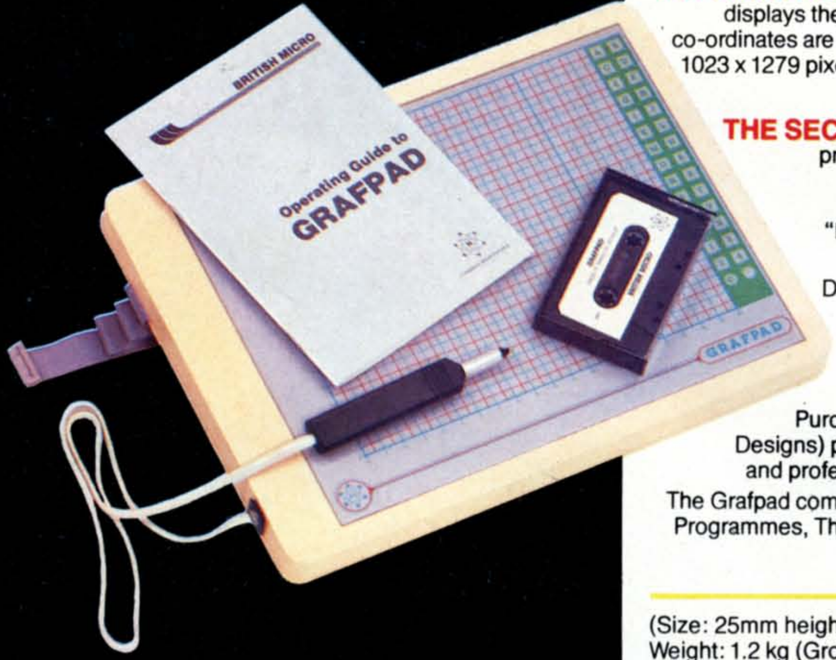

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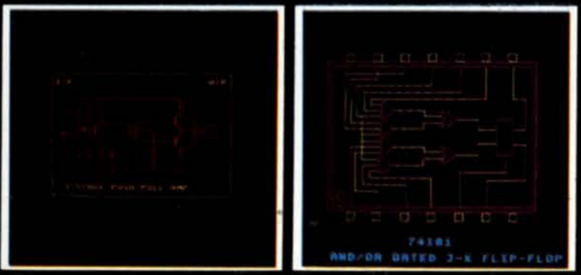

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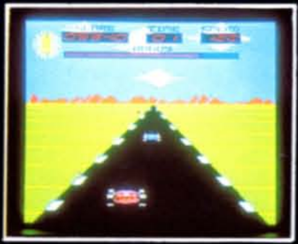
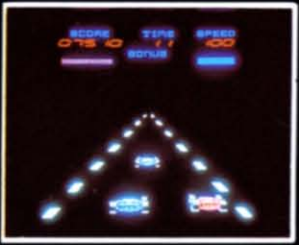

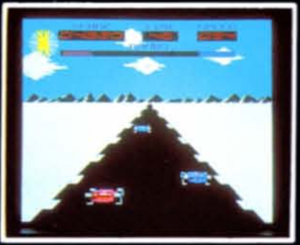
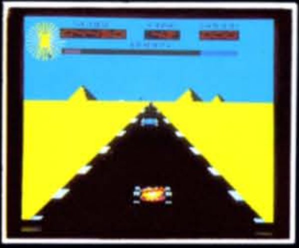
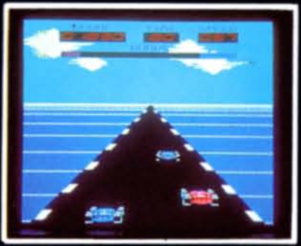
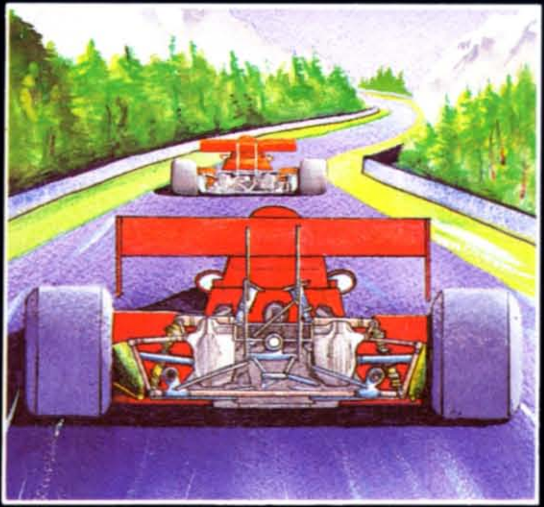

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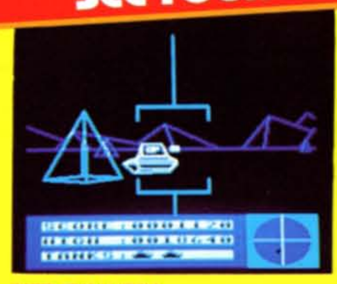
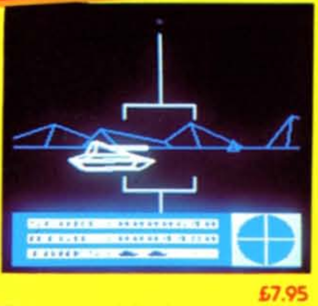

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